RAILROAD GAZETTE

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CONTENTS

CONTRIBUTIONS:	PAGE.
Another Water Tube Locomotive Boiler	17
ILLUSTRATIONS:	
A Railroad Bridge-Crane	19
The Strength of Flat Boiler Plates	19
Tramrail Systems for Conveying Material	22
Fluctuations in the Prices of Rails, etc	23
The New Drexel Dust Guard	26
EDITORIALS:	
The Railroads and the Erie Canal	24
Railroad Rates and Railroad Employees	24
A Year of Unstable Rates	25
EDITORIAL NOTES	24, 25
New Publications	26
GENERAL NEWS:	
Locomotive Building	28
Car Building	28
Bridge Building	28
Meetings and Announcements	29
Personal	29
Elections and Appointments	30
Railroad Construction	30
Electric Railroad Construction	31
General Railroad News	32
Electric Railroad News	32
Traffic	32
MISCELLANEOUS:	
Technical	27
The Scrap Heap	28
Railroad Grade Crossings Under the Illinois Law	17
Locomotive Service	18
Some Effects of the Decline in Rates	19
Some Former Wabash Officers	21
Pittsburgh as an Iron Center	22
Tensile Tests of Cast Steel	23
A Car Ferryboat for Lake Michigan	23

Contributions.

Another Water-tube Locomotive Boiler.

HARTFORD, Dec. 20, 1895.

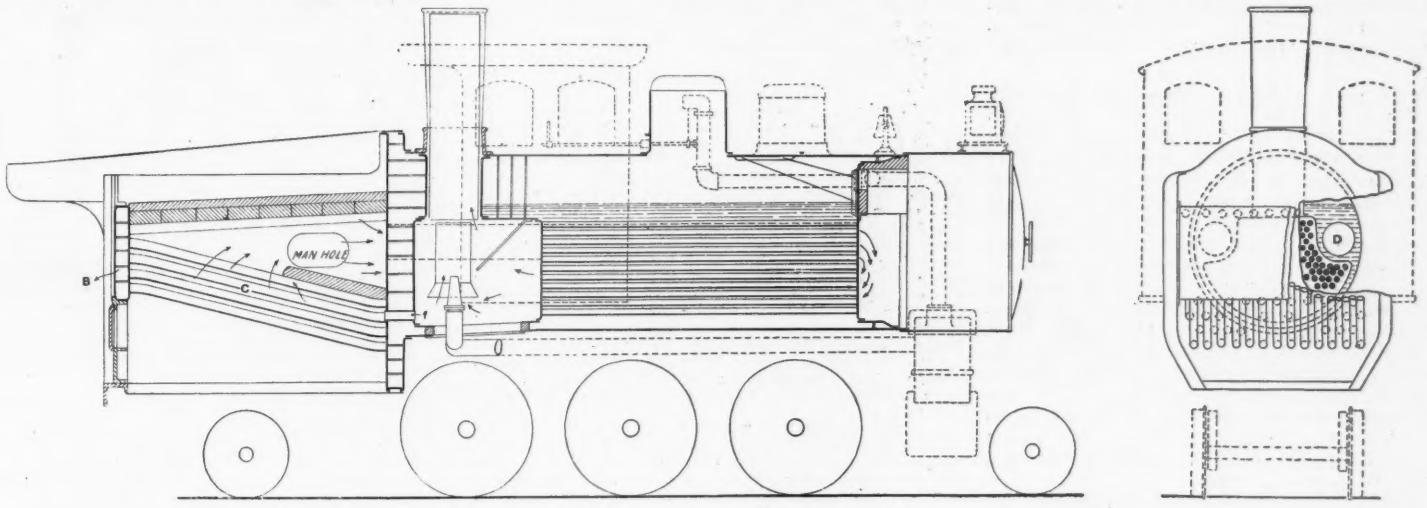
TO THE EDITOR OF THE RAILROAD GAZETTE:

In your valuable paper of Nov. 1, I noticed a short article by Mr. C. M. Higginson, on the requirements of the locomotive boiler of the future which interested me, as about that time I was designing a locomotive boiler. In a later issue I saw a tendency to a change, as illustrated in C. B. & Q. engine No. 590 (*Railroad Gazette*, Dec. 6, p. 799) and in your issue of Dec. 13, the discussion at the meeting of the Western Railway Club would seem to indicate that we may look for marked changes and improvements in locomotive boilers in the near future.

Mr. Forsyth of the C. B. and Q. has shown a bold deviation in his water-tube firebox, illustrated in the same number, and I beg to submit a design which also has the object of a combination of the water-tube and flue boiler, and which differs materially from anything now in use.

The water-tube boiler has come to stay and the application of water tubes in steam generators is steadily increasing. What is sought in the boiler illustrated is a largely increased and more effective heating surface in the firebox, a longer flame way and a larger grate area, probably in a great measure the issue of smoke from the stack will be prevented.

JOHN CHRISTIANSEN, *M. E.*;
An old Master Mechanic.



Christiansen's Design for a Water-Tube Boiler for Locomotives.

also the combustion of gases and smoke in the smoke arch, which in this case is located at the rear end of the boiler, near the firebox.

A brief explanation of the drawing may be desirable. The firebox consists simply of two waterlegs extending backward from each side of the boiler and connected across at the top of the rear end by a waterleg *B*, which receives the water tubes inserted in the boiler and in said rear waterleg in the manner of the Heine boiler or similarly. Two large flues 12 in. in diameter lead from the firebox to the front end of the boiler, and the usual 2-in. or 2½-in. tubes carry the products of combustion again toward the rear and into the smoke arch which is located there, and from said smoke arch in the usual manner, and impelled by the exhaust of the engine out through the stack.

A short tube *f*, inserted in the lower end of the firebox and connecting the firebox directly with the smoke arch, and admitting a jet of flame from the firebox directly into the smoke arch, aids the combustion of unconsumed gases and smoke before they enter the stack, and thus

Railroad Grade Crossings Under the Illinois Law.

Embodied in the annual report of the Railroad & Warehouse Commission of the State of Illinois for the year 1895, is a report by the consulting engineer of the Commission, Mr. Dwight C. Morgan. A particularly interesting part of his report is that in which he takes up the suject of the intersection of railroads at grade, giving information as to the workings of the several laws of the state. This he has done as the result of many inquiries from different parts of the country, and the summary seems to us of sufficient general interest to justify its pulication at considerable length in our columns.

The generally level surface of the state, rendered the crossing of one railroad by another on the same level the simplest and in first cost the least expensive method. . . . Of the approximately 800 intersections of railroads in Illinois, but 54 of them have been disposed of by being constructed over or under the railroad crossed. The conditions affecting the 740 crossings established at grade are diversified, not only in the dangers attending the movement of trains over them, but in the complex arrangement of the tracks and the attending inconvenience to the railroad companies and to the public. Sixteenth street in the City of Chicago is cited as being so intricate in the arrangement of the tracks involved, that without extensive alterations it would be impossible to install appliances that would prove effective for the safe movement of trains.

. . . It became the general practice by the companies to stop their trains before proceeding over the tracks of another railroad. While this action reduced the liability to crossing accidents, yet it was not sufficiently effective in determining the rights of the respective companies, and there also existed an indefinite understanding as to what constituted a stop for the crossing. This embarrassment resulted in the enactment of a law, made effective July 1, 1872, entitled "An act to prevent injury to persons or property at railroad junctions or crossings." This law required all trains to come to a full stop at a distance of at least 200 ft. before entering upon said crossing or junction, and not more than 1,000 ft. from the same, and if practicable within said limits to stop in full view of said junction or crossing. . . Oftentimes a difference of opinion existed between trainmen as to which of two trains was first entitled to pass over the crossing; the increase in the number of crossings established enhanced the dangers to trains, and it was found that the many crossings very seriously interfered with the prompt and efficient movement of trains. On one of the important railroad lines in the state extending from Chicago to East St. Louis, conformity to the law necessitated 28 stops exclusively for railroad crossings at grade. . . .

July 1, 1887, a law entitled, "An act in regard to the dangers incident to railroad crossing on the same level" became effective. This law while not affecting the provisions of the act of 1872 and the amendment of 1885, provided further, that upon the construction of signaling appliances at grade crossings of railroads, by which it is rendered safe for engines or trains to pass over such points, and which shall first be approved by the Railroad & Warehouse Commission, that it shall then be lawful to run such railroad crossing without stopping, any law to the contrary notwithstanding. It was further provided in this act, that the Railroad & Warehouse Commission shall have the power in case such interlocking shall by experience prove to be unsafe or impracticable to order the same discontinued.

It was upon this law that the matter of protecting grade crossings of railroads in Illinois first took definite form, the result being that in the four years' interval from July 1, 1887, to July 1, 1891, 25 railroad crossings were equipped.

This law not being mandatory, the protection of these crossings was entirely voluntary on the part of the railroad companies and therefore upon some satisfactory agreement between them as to the division of the cost of construction, maintenance and operation of the devices. Up to July 1, 1891, the crossings equipped with interlocking were confined to companies of sufficient financial ability to warrant them in the expenditures necessary to overcome the dangers and inconveniences, which were so apparent.

The advantages derived from the equipment of these crossings were so manifest that other companies sought to have crossings on their roads protected, but as there were always two or more companies whose lines were involved in the crossing, some of them did not feel justified in making the necessary expenditures. This, and in some instances an inability to agree as to the division of the items of expense involved, prevented their more extensive introduction. . . . Any crossing equipped without the consent of all parties interested, to share in the expense, had to be upon the basis of one company bearing a large part or all of the expense involved. This act did not provide for the protection of drawbridges, of which there are many in the state. . . .

The act of 1887 was amended May 28, 1891, to include protection for drawbridges, and also a separate bill was introduced to the legislature and passed in June of the same year entitled, "An act to protect persons and property at the junctions and crossings of railroads by providing a method to compel the protection of the same." This law, which became effective July 1, 1891, does not affect the provisions of the original or amended act of 1887, but confers such additional power on the Commission as is necessary for a determination of cases arising in connection with the protection of all crossings at grade.

The practical workings of the laws of 1887 and 1891 set forth three methods of procedure by which grade crossings may be equipped with interlocking devices:

1st. Under the act of 1887 the railroad companies are given opportunity to agree between themselves.

2d. In case the railroad companies cannot agree either party may appeal to the Commission for its determination of all or any points that may be in contention.

3d. In case any railroad crossing is deemed by the Commission to be unsafe, authority is conferred on it to cite the railroad companies to appear before the Board and show cause why the crossing of their lines should not be protected by an interlocking device.

Of either of the three methods by which any interlocking case may have been determined and the crossing equipped the Commission in all instances exercises its authority; 1st, in the approval of the plan of the proposed devise, and 2d, upon completion, causing the same to be examined that compliance with the statutes may be had. . . .

Upon satisfactory evidence to the Commission that the law and its requirements have been complied with a permit or certificate of authority is issued to the railroad companies giving them the right to run the crossing under the following provisions:

1st. Said companies shall cause said device to be frequently inspected, and shall keep the same in first-class working order and in good repair, and shall provide for its efficient operation by a competent person or persons, so long as it shall be in use under this permit.

2d. Each engine and train shall be brought under control after passing distance signal, and shall proceed under control over said crossing. "Control," as here used, means speed of train must be governed by brake power at command, and in no case exceed the power of trainmen to readily stop train within safe distance should danger appear between distance signal and crossing or at crossing.

3d. No change shall be made in the location of said device or any of its parts, nor in the mechanical construction thereof, nor in the manner of operating the same, without the approval of the Commission; and, in case of any such change without such approval having first been obtained, the authority hereby conferred shall at once cease.

Under the foregoing laws there have been constructed by the railroad companies and placed in operation

throughout the State under the authority of the Commission 115 interlocking plants. In a number of instances three or more railroads cross in close proximity to each other, and to obtain the most practical and economical results the devices constructed at such points have been so arranged as to protect all crossings involved.

In this way, of the 115 plants installed, protection is afforded to 131 crossings. Ninety-nine plants have been constructed by agreement between the railroad companies. Sixteen cases have been appealed to the Commission for determination, several of which were subsequently agreed upon and dismissed by request of the petitioners. Three citations have been issued by the Commission, one of which was dismissed, one agreed upon, and one merged into a petition.

The necessity of equipping the crossing having been determined upon, the principal points of disagreement between the railroad companies, as affecting the division of the several items of expense, and which have been contended in the cases before the Commission, may be briefly set forth as follows:

1st. That the division of the expense should be in proportion to the number of main tracks of each road involved in the crossing.

2d. That the division of the expense should be in pro portion to the number of trains passing over the crossing on the respective roads.

3d. That the division of the expense should be in proportion to the number of levers in the machine reguired for each road.

4th. That each road should pay the expense of constructing the device in its own tracks, and the cost of operation and maintenance adjusted upon the basis of proportionate levers required for each road.

5th. The force of existing contracts or agreements between the companies as to the protection of the crossing and the division of expense.

These points, upon which issue has been taken, may have reference to the cost of construction, cost of maintenance or cost of operation, or all of them. The decisions of the Commission show that consideration has been given to each, but under the various conditions affecting the different crossings it has been impossible to adopt any unyielding principle of determination that could be used as a precedent in all cases.

There are approximately about 600 unprotected grade crossings yet in the state, but the complete applicability of the present laws to all crossings of this character and the evidence in hand as to contemplated work, indicate that many of them will be protected in the near future through the same spirit of united interest on the part of the railroad companies which has characterized the progress already made.

A number of times has the question been asked, "Why does not the Commission exercise its power to compel the protection of all railroad crossings at grade in the state?" To those who have given but little consideration to the subject, the extraordinary results of such an order are not apparent.

Of the plants now installed, the number of levers in the interlocking towers average, for all plants, 22 working levers. I am satisfied that the remaining unprotected crossings would average fully as many levers per plant.

Taking as a general basis an average of 22 levers at the present price paid for mechanical interlocking, each machine, installed and ready for operation, would cost about $5,500, without taking into consideration the very considerable expense of the other improvements made necessary at the time any crossing is equipped. To equip the 600 unprotected crossings in the state would require nearly $3,500,000 in first cost for the devices alone, and most probably a very much larger sum, as there are crossings where mechanical interlocking would not be the most practicable, and in substitution the more expensive electro-pneumatic systems would be adopted.

The average expense of operating and maintaining the devices respectively now in service in the State including depreciation, is as much as $1,800 per annum, equivalent to 5 per cent. interest on $36,000 for each plant. Applying this to the 600 unprotected crossings and it would necessitate an annual expense of $1,100,000, equivalent to 5 per cent. interest on $22,000,000.

It being true that many of the crossings of the more prosperous roads are at this time equipped, the burden of the expense would fall largely upon those companies least able to bear it. While there are compensating features to be derived from the protection of many of the crossings by interlocking devices, yet there are some instances where appliances of this character would not benefit in proportion to the current expense involved.

However, the chief function of the interlocking laws as laid down in the opinions of the Commission, is the protection of the public, and with this end in view, an exercise of authority from time to time as the exigencies demand, will doubtless be made, but at the present time the progressive policy of the railroad companies and the results already obtained through their voluntary action in equipping crossings, would not seem to justify serious consideration of such a comprehensive order as that suggested.

The question naturally arises—Is the continuance of all railroad crossings at grade and their equipment with signaling appliances, a complete and ultimate solution to the problem? In many cases it is, by reason of the local conditions existing and which are impossible of remedy except by very large and unjustifiable expenditures, and again there are many crossings at grade where it is entirely impracticable to alter the conditions. On the other hand, a considerable number of the grade crossings of railroads in Illinois present local conditions favorable to an alteration in the grades of the lines . . .

Of the crossings established at grade throughout the state, and for which protection has been provided, without exception preference has been given to interlocking devices rather than to reconstruct the roads and effect an overhead and underneath intersection. This is also true in the building of new lines in which the crossing of an established road at grade, and its protection by interlocking has been insisted upon by the junior road mainly through the motive of reducing the first cost of construction. In a measure this condition may be overcome in the discretion of the Commission through the power conferred on it by the act of 1889, entitled "An act in relation to the crossing of one railway by another and to prevent danger to life and property from grade crossings."

This law provides that, in the event of a failure of the railroad companies to agree as to the place and manner in which a new road proposes to cross an established line, either party may appeal to the Commission for its determination of the case. It is believed that under the force of this enactment together with the benefit of past experience, greater weight in the future will be given to the question of overhead and underneath crossing of railroads.

As an illustration take the case of a simple crossing of two lines at grade, in which the local conditions render it practicable to alter the grades with a view of establishing one line above the other. The two propositions involved may be briefly set forth as follows:

1. Continue the intersection of the lines at grade, and equip the crossing with interlocking at an expense of at least $2,000 in first cost, and incur an annual expenditure for an indefinite period of years in its operation and maintenance, equivalent to 5 per cent. interest on $30,000 or

2. Expend from $10,000 to $25,000 in first cost to avoid not only the crossing of the lines at grade, but also substantially all subsequent expense except that which is necessary to the maintenance of the roadway in common with other parts of the lines. . . .

Satisfactory progress in the protection of grade crossings has been made during the past year; 14 new devices have been constructed and six plants built prior to this year have been remodeled and enlarged. Plans have been submitted and approved for the protection of 15 additional crossings, most of which are now in process of construction.

Locomotive Service.*

BY J. H. M'CONNELL, SUPERINTENDENT OF MOTIVE POWER, UNION PACIFIC SYSTEM.

Twenty-five years ago a large portion of the freight and passenger traffic in the United States was handled with 16 × 24-in. cylinder engines. On a few roads with heavy grades 45-ton 10-wheel engines and 50-ton consolidation engines were used. The maximum load in a freight car was 20,000 lbs., and to prevent loading cars beyond that limit a charge of double first-class was added to the excess. With an increase of freight traffic came the 28,000-lb. capacity car; this was very shortly followed by the 32,000-lb. capacity car. As new equipment was needed the 40,000-lb. capacity car was introduced, which for a time was considered as having reached the limit for freight cars. The 50,000-lb. capacity car followed, then the 60,000-lb. capacity car, while to-day we see occasionally a car with a capacity of 80,000 lbs. The modern refrigerator car with its load and ice weighs about 100,000 lbs.

The 20,000-lb. capacity car carried 300 bushels of grain; the modern box-car carries 1,000 bushels of grain. Every part of the railroad equipment, the track and bridges, has been increased to keep up with the advance in the freight car. The same is true of the passenger equipment. With the 20,000-lb. car we had the sleeping-car weighing 60,000 lbs., and considered by many people entirely too heavy for the track. It is quite common now to see coaches weighing 80,000 lbs. and sleepers weighing 100,000 lbs. The 56-lb rail was followed by the 60, 67, 70, 75, 80, 90-lb. rail, and 100-lb. rail is being laid on some of the Eastern roads. The locomotive, to meet the increased service, has grown from a 30-ton eight-wheel engine to a 60-ton eight-wheel engine; the 10-wheel engine from 45 tons to 70 tons, and the consolidation engine from 50 tons to 80 tons.

Notwithstanding the greater carrying capacity of the present equipment, the constant decrease in rates made by active competition causes less revenue to be derived from hauling a car containing 60,000 lbs. of freight than was received in 1870 for hauling a car containing 20,000 lbs. of freight. From 1870 to 1880 there was a decrease in amount of revenue per ton per mile of 48 per cent.; between 1880 and 1894 a further decrease of 50 per cent. Comparing the rate per ton per mile earned in 1870 with 1894, there has been a decrease of 74 per cent. The revenue derived from hauling a car containing 60,000 lbs. of freight in 1894 was 22 per cent. less than that obtained from hauling a car containing 20,000 lbs. of freight in 1870. The train expense is greater, the general expense is greater, and the entire cost of operating a railroad is greater than in 1870. A railroad of any importance that shows operating expenses less than 65 per cent. of earnings is accused of failing to maintain the property. The ratio of operating expenses to earnings of six railroads running into Chicago shows the following percentages: 65.86 per cent., 68.37 per cent., 72.80 per cent., 62.35 per cent., 57 per cent., 74.59 per cent.

Work Done by Locomotives.—The question is often asked if the modern locomotive moves as much tonnage in proportion as the smaller engine did 25 years ago. Old engineers frequently remark that the engines of to day do not do the work in proportion to their size that the smaller ones did 25 years ago. Facts show that we are getting better work with the modern engine. Every condition is more favorable to the modern engine; we have greater weight on driving wheels, larger heating surface and increased steam pressure. Some records show a consolidation engine built in 1870 to have had 20 × 24 in. cylinders, a total weight of engine of 100,000 lbs., with 85,000 lbs. on driving wheels, 1,500 ft. heating surface in the boiler, and 140 lbs. steam. A consolidation engine built in 1895 shows a great difference in everything except the cylinders, which are the same. The total weight of engine now is 150,000 lbs., weight on drivers 137,000 lbs., heating surface in boiler 2,200 ft., steam pressure 180 lbs. The engine of 1870 hauled 24 loads weighing 528 tons, while the 1895 engine hauled a train of 35 loads weighing 1,120 tons over the same division. The increase in passenger service is almost as marked. Twenty-five years ago with a time schedule of 22 miles an hour it would have been considered an impossibility to make an engine haul 10 cars on a schedule of 40 miles an hour, yet it is now done every day, and these engines maintain a speed of 55 miles per hour between stations with 10 cars. Have we reached the limit with the modern engine, and have we determined how much a locomotive can be made to earn for the company?

Tonnage Rates.—The question should only be considered from one standpoint, that is, how much can we make the engine earn? To accomplish this, that is, make it earn all it can, the idea must be given up that an engine should run from 75,000 to 100,000 miles before it is taken in the shop. When freight engines are kept in service until they have made that mileage the company is not getting the revenue the engines could earn. An engine in freight service should haul every ton of freight it is capable of doing regardless of cost for repairs and fuel. When the performance is considered on a mileage basis, or with reference to how cheap it can be run and how many miles it will make between general repairs, there will be frequent complaints made by the mechanical department of over-loading, and an effort will be made to have the train reduced in order to favor the engine so there can be a better average made on repairs and coal. After four years' experience with tonnage rating on grades ranging from 40 to 96 ft. to the mile, it has resulted in a general increase in average number of cars per train. Where 22 loads was a train over some of the heavy grades, by the tonnage system frequently 26 cars are hauled with the same engine that hauled 22 cars for a full train. In another case where 28 cars was a full train, a tonnage rating has increased the train to 35 loads with the same engine. It was supposed that 28 loads was a full train, and trainmen were of the opinion that the engine could not pull 35 loads, but after several tests it was demonstrated that the engine was capable of doing this, and no further trouble was experienced in hauling a train of 1,100 tons.

Whenwe consider the service of a locomotive from the standpoint of what it can earn, and not what it costs per mile to run it, we will then begin to increase the number of freight cars per train and arrive at the question affecting the revenue of the company, and that is the cost of hauling a loaded car per mile or cost of hauling a ton of freight one mile. There are very few roads in the west on which the train haul could not be increased on some of the districts. An increase of one car, containing 20 tons of freight, in each train will increase the earnings of a locomotive in one year $7,200, and the only additional expense would be 90 tons of coal. Taking the average of a locomotive at 3,000 miles per month, or 36,000 miles per year, we have the revenue of 20 tons of freight hauled the same mileage at one cent per ton per mile or 20 cents per mile per car. There has been no increase in the wages of the engineer, fireman or trainmen, or for repairs. The only extra expense has been five pounds of coal per car mile. Taking the average tonnage per car for the year on six Western roads, which is 11.44 tons per car, the locomotive can earn on this basis $4,118.40 per year for the company more than it did before. By keeping the engine in first-class condition at all times, I believe every locomotive in freight service on our Western roads can be made to earn at least $4,000 more for the company, per year, than at present; and the expense will not be increased except for fuel at the average rate of five pounds of coal per car mile.

Reports of Performance and Cost.—The monthly statements of locomotive performances sent out by railroads, when compared, show a wide difference in cost, and unless the conditions of making them up are known the comparisons are unsatisfactory. Some roads allow engines only actual mileage between terminals, regardless of length of time making the trip. Should the train be delayed several hours by switching or meeting trains, no mileage is allowed. In helping service the engine is only credited with actual mileage. While the crew will receive a day's pay the engine may make but 30 miles in 12 hours.

It is the practice of a number of roads to allow constructive mileage to all engines in passenger and freight service. Some roads add 10 per cent. to the mileage, as it is claimed to make up for the coal and oil used in taking the engines from the roundhouse to the train and in leaving the train and being put in the roundhouse. In addition to this they are allowed 10 miles per hour for switching or layouts on the road. Where overtime is paid the engineer, the engine is given mileage to make up for it. By this system of watering mileage a locomotive report is made to show a good average on coal and oil and low cost for repairs and a large individual engine mileage, when the actual cost is 10 to 15 per cent. greater than that shown by the report.

Taking the annual reports of some Western roads, considering the freight engine mileage with freight car mileage, they show the following percentages of freight engine mileage to freight car mileage:

4.06 per cent.	4.24 per cent.
4.76 "	5.35 "
4.37 "	5.32 "

The combined mileage of passenger and freight trains compared with the engine mileage in same service shows following percentages of engine to car mileage:

8.78 per cent.	7.76 per cent.
7.57 "	11.29 "
7.44 "	6.48 "

The following gives number of cars per train when figured on same basis for all the roads:

18.80	20.09
18.66	17.73
23.60	24.66
22.86	

There is no uniformity in rating trains. One road rates two empties as one load, others three empties two loads, and others five empties three loads. A train of 10 loads and 20 empties under these systems would be called respectively, 20 loads, 23 loads and 24 loads. But the showing on paper would convey the impression that one road was hauling a greater number of cars per train than another, when there is a probability that the road showing the smaller train was moving the same tonnage.

Following this matter still further, the average tonnage for a loaded car for the year on the five roads shows:

12.87 tons.	14.40 tons.
9.09 "	12.26 "
9.84 "	

With such a variation in the manner of allowing mileage and rating trains, no satisfactory comparison can be made, and until all roads show the cost of moving a

* A paper read before the Western Railway Club.

loaded passenger and freight car one mile, locomotive performance sheets will be of little value for comparison.

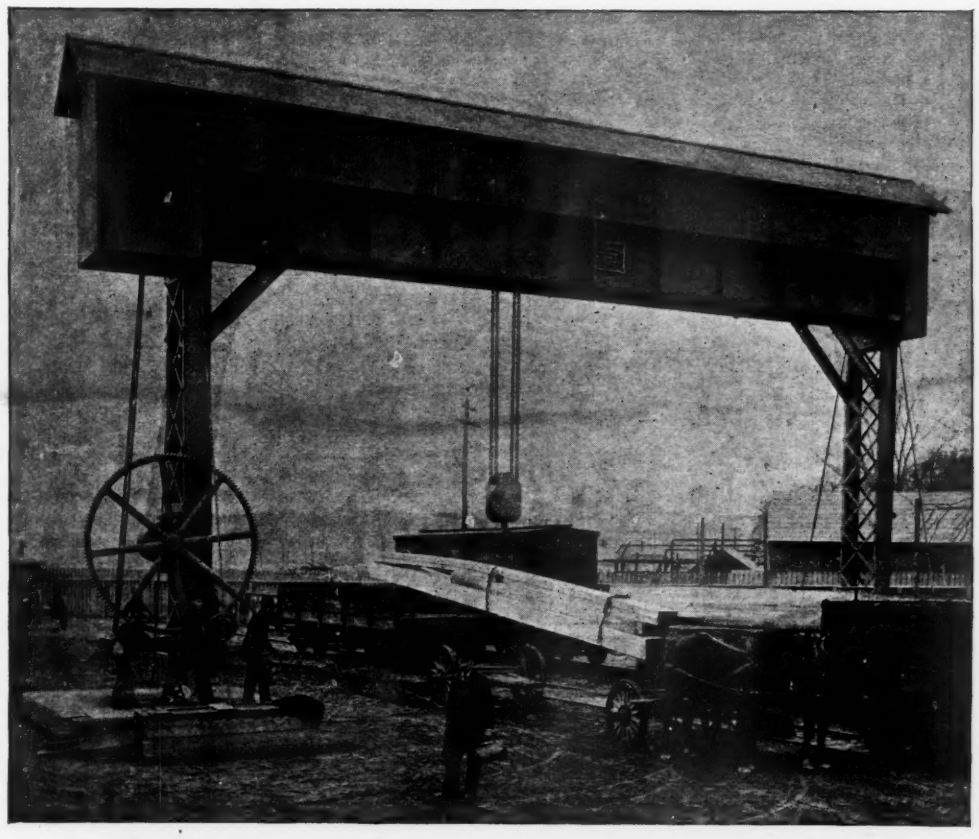
How to Increase Revenue.—The problem of to-day with decreased rates is to haul greater tonnage in each car and reduce the cost of doing it. The revenue of a railroad is derived from the service rendered by its locomotives. To increase the revenue the locomotives must do more work. The tendency is to increase their weight and size, and there is not enough attention paid to getting increased service of those now owned. The freight earnings largely exceed the passenger earnings, and by directing efforts to hauling increased tonnage the revenue is increased without any great increase in operating expenses. The weight of a train over a division is usually determined by the amount of tonnage an engine can haul over certain grades. In nearly every case increased tonnage can be hauled if the mechanical and transportation departments work together. An increase in the steam pressure of five pounds will, in many cases, take one more car over the grade.

When the mechanical departments of our railroads give the same attention to increasing the train haul that they do to making a showing of how cheap they can run the locomotives per mile, they will find they have obtained increased service from the locomotive, decreased the cost of hauling a ton of freight, and increased the revenue of the company. The problem of to day is, how much does it cost to haul a ton of freight one mile, not what it costs per mile to run your locomotives.

A Railroad Bridge-Crane.

The bridge crane which is illustrated has been in operation about a month at Providence, on the tracks of the New York, New Haven & Hartford. It was designed and built by the Brown Hoisting & Conveying Machine Co.

It has a lifting capacity of 30 tons and is worked by hand. It has a clear span of 44 ft. and a height of about 22 ft. Four men can lift 30 tons on this crane without difficulty. Its distinctive features are that it is impossible for the load to run down except at the will of the operator, and while the load is being lowered the handles remain stationary—that is, there are no flying handles. It is a high-class machine and thoroughly safe to put into the hands of inexperienced men, being simple and yet effective.



A Railroad Bridge-Crane, Made by the Brown Hoisting and Conveying Machine Company.

Some Effects of the Decline in Rates.

In the January issue of the *Engineering Magazine* appears an article by Mr. H. T. Newcomb under the title of "Are American Railway Rates Too High?" Mr. Newcomb has some special qualifications for such a study. For seven years he was in the Bureau of Rates and Transportation of the Interstate Commerce Commission, and last March he was appointed Chief of the freight rate section in the division of statistics in the United States Department of Agriculture. We reprint from the article extracts which will give some measure of the decline and of its results on income and on the employees.

The average charge for carrying a ton of freight one mile via thirteen of the most important railroads in the United States during 1865 was 3.08 cents; 1870, 1.80; 1875, 1.36; 1880, 1.01; 1885, 0.83; 1890, 0.77; and 1893, 0.76. These railroads performed one-third of the entire freight transportation during 1893, and from the figures given it appears that 76 cents would pay for as much transportation over their lines in 1893 as could have been obtained for $3.08 28 years earlier. This reduction, amounting to three-quarters of the average rate for 1865, has been exceeded by that in the price of but few even of those articles in the manufacture of which new inventions have worked the most radical changes. For the present purpose of comparing freight rates with contemporary prices it is unnecessary to reduce currency rates (prior to the resumption of specie payments in 1879) to the gold basis; but in considering the absolute reduction in rates the proper allowance should be made. The entire transportation performed by the railroads of the United States during the twelve years ending June 30, 1894, was equivalent to moving 136,799,677,822 passengers and 807,935,382,838 tons of freight one mile. Had rates averaging as high as those of 1882 been collected upon this traffic, the railroads would have earned $2,629,043,459 more than they actually received.

Though the railroad system of the United States increased from a total length of 114,712 miles in 1882 to 178,709 miles on June 30, 1894, or 56 per cent., the aggregate sum paid in dividends during the latter year was only $95,575,976, being $6,455,458, or 6½ per cent. less than during the former. During 1871 railroad dividends throughout the United States averaged $1,265 per mile of line operated; this average has steadily declined to $988 in 1881, $565 in 1891, and $557 in 1894. During the year ending June 30, 1894, railroad stock having a par value of $3,660,150,094, or 63½ per cent. of the total, received no dividend—a larger amount, both actually and relatively, than during any year since the interstate commerce law was passed. In the same year no interest was paid on 14 per cent. of all mortgage bonds, 12 per cent. of miscellaneous obligations, and 87 per cent. of income bonds. On the same date 192 railroad companies, operating more than 42,000 miles of line and representing one-fourth of the total railroad capitalization, were in the hands of Receivers. During the three years ending Dec. 31, 1894, Receivers were appointed for railroads having a total length of 46,873 miles, capitalized at $2,534,529,000; and 9,178 miles, capitalized at $494,821,000, were sold under foreclosure. From Jan. 1 to July 1 of the present year these totals were increased by 2,409 miles, capitalized at $149,615,000, and 2,396 miles, capitalized at $100,941,000, which, respectively, went into the hands of Receivers and were sold under foreclosure. According to the preliminary report of the Statistician of the Interstate Commerce Commission for the year ending June 30, 1894, the income of the railroads in a section, including 52 per cent. of the area of the country, did not produce enough above the actual cost of operation to pay their fixed charges during that year.

These statistics of decreasing returns to investors, financial disaster, and widespread insolvency clearly indicate that the present railroad charges are not too high, unless it is desirable to reduce all railroad corporations to a condition of uniform and hopeless bankruptcy, even if they do not demonstrate, as might be urged with some evidence of justification, that the returns now produced by railroad rates are actually lower than is reasonable and just.

The expenses due directly to handling traffic and moving trains are much less elastic than those incurred for keeping up the quality of track, rolling stock, and signaling apparatus; and, when depleted revenues enforce upon railroad managers the necessity of immediate retrenchment, the latter are most likely to suffer. Thus, when, during 1894, reduced traffic, low rates, and dwindling earnings required a reduction of 93,994, or nearly 11 per cent., in the number of men employed by the railroads, nearly one-third of the entire number was taken from trackmen, their number being reduced 16⅓ per cent. The decrease in the number of employees assigned to the maintenance of way and structures was 16 per cent.; in those assigned to maintenance of equipment, 13⅓ per cent.; while in those assigned to the work of conducting transportation it was only 8 per cent. During the same year the expenses of operation were reduced 11⅜ per cent. as compared with the previous year. Of the total decrease of $96,506,977, 51 per cent. was taken from the expenditures incident to the maintenance of way, structures, and equipment, though these combined ordinarily constitute only about 37 per cent. of the total expense of operation.

The frequent failure of railroad enterprises to prove remunerative results in enhanced difficulty attending efforts to secure capital for the construction of new and often much needed lines, and in the exaction of conditions which afford at least a chance of extraordinary profits as an offset for what is regarded as the extra-hazardous nature of the investment. This opportunity for large returns very often takes the form of an excessive discount on the securities offered or—what is much the same thing—a large stock bonus to accompany sales of bonds, these being among the most frequently deprecated methods of "stock-watering."

Practically, it may be declared that the public, considered as distinct from railroad owners, must finally pay for all the transportation it receives, and that too low rates between particular points or during a particular period are not desirable, because, if for no other reason, they will inevitably be offset by too high rates between other points or during another period. Nor is this conclusion, as might appear, entirely satisfying to present railroad owners, for, long before the period of compensation arrives, their interest may have been destroyed by insolvency, bankruptcy and foreclosure.

It is apparent, then, that, considered from any reasonable standpoint, the present level of railroad rates is too low rather than too high.

Railroad managers have attempted in many ways the abolition or adequate restriction of competition, but no method ever devised, short of actual consolidation, has proved as effective and satisfactory as that somewhat erroneously termed "pooling." Against this custom, when it existed, was directed much popular antipathy, which was fostered and encouraged by every demagogue who saw advantage to his personal interests in availing himself of the strength of an unreasoning prejudice, and it has been forbidden by state and national legislation; but it is now coming to be universally recognized that evidence justifying such popular distrust and suspicion is wholly wanting.

Strength of Flat Boiler Plates.*

(*Concluded from page* 838.)

Since the original publication of Part I. extensive experiments with flat boiler plates supported by braces have been performed by the German Government at the Imperial Docks of Danzig.

The results, which testify to the comparative merits of the two modes of fastening braces, Fig. 1 and Fig. 2, are given herewith. In the treatment of these results, values for μ have also been determined.

The experiments which were conducted between the years 1884-92 were performed with 14 braced plates, not including the end plates of the pressure cylinder, which are considered as parts of the testing apparatus. The plates were 58.112 in. (1,476 mm.) diameter to the centers of the screws which fastened them to the flange of the testing cylinder, and .354 in. (9 mm.) to .709 in. (18 mm.) thick. Fig. 3 shows the apparatus before and also at the end of a test, together with the device for determining the amount of deflections, the dimensions being in milimeters. The testing cylinder, or pressure box, was made by Krupp, of Martin steel, calculated to withstand a pressure of 80 kg. per square centimeter (1,138 lbs. per square inch); it was finished inside and out and provided with necessary inlets and outlets for water and air. For each experiment an end plate thicker than the plate to be tested and provided with the hand-hole shown in the cuts was furnished. Each plate was bolted to the cylinder flange, under a clamp ring 4 in. broad, by 52 steel bolts, 1½-in. diameter.

Joints between plates and flanges were made tight by red lead cement. In the last experiments rubber rings with wire gauze centers were also inserted. Each flange bolt, too, was wrapped with hemp and red-leaded.

The braces were turned throughout their length and fastened in one of the two ways shown in Figs. 1 and 2 (Fig. 19 and 20 of the last article), the joint being made with hemp and red lead.

The device used to measure the deflections, Fig. 3, consisted of a flat wooden box at each end mounted on four adjustment screws. A number of little bronze thimbles in the sides of these boxes served to guide iron pointed wooden rods, the amount of whose movement was a measure of the deflection at the points of the plate against which they rested. This means of determining deflections, notwithstanding the extreme care exercised by the observers, did not prove altogether satisfactory.

In every experiment, after filling the cylinder with water, hydraulic pressure was exerted and gradually increased until leaks or ruptures put a stop to the test. The pressure was indicated by two gages on the cylinder. Six single-acting pumps were used and so arranged that 40 men could work at them simultaneously; this became necessary at times when all pumps had to be worked at high pressures (700 lbs.) as rapidly as posible to compensate for leaks through ruptured joints. The first tests were those in which the braces were set with a constant pitch. There were 12 braces set 13.7 in. apart, as seen in Fig. 4 for plate IIa, which shows as well the position, shape and size of hand-hole in the end plate; Roman numerals designate the ends of the braces and Arabic the centers of the several sections or fields into which the plate is considered as being divided. Fig. 5 and 6 for plate IIa show the style of fastening at the two ends. The deflections were measured at pressure intervals which varied according to circumstances, and the set, if any, observed at the end of each interval after releasing the pressure, whose deflection had been taken.

Fig. 7 shows how plate IIa was cut up after the test into strips for final tensile and bending tests. The

* Translated and condensed from the German by Mr. W. W. Nichols, M. E., Instructor in Mechanical Engineering, Yale University.

braces were tested likewise and the results, partly given below, plotted in the form of curves of Figs. 8 and 9:

Specimen.	Dimensions of Test Piece. Diam. or Thickness.	Ultimate stress, lbs. per sq. in. With Fiber.	Across Fiber.	Per cent. of Elongation. With Fiber.	Across Fiber.	Bending Test Cold. With Fiber.	Across Fiber.
		Before the Test.					
Brace O.....	1.917	49,64	.....	18.9	.....	.....	.....
		After the Test.					
Brace V.....	1.86	54,760	.....	8.9	.....	.....	.....
" VIII....	1.86	55,750	.....	18.3	.....	.....	.....
" IX.....	1.85	54,050	.....	7.9	.....	.....	.....
Plate A.	.561 × 1.917	.....	61,020	.....	13.3	.....	58°
" B.	.565 × 1.92	.....	59,590	.....	13.5	.....	.....
" C.	.567 × 1.92	61,590	.....	17.5	.....	108°	.....
" D.	.566 × 1.917	59,030	.....	16.	.....		.....

Elongation was measured in a length of 39.37 in. (1,000 mm.) in the test of the braces, and of 7.87 in. (200 mm.)

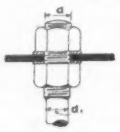


Fig. 1.

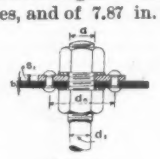


Fig. 2.

in that of the plate. Rupture occurred outside of this length in braces O, V. and IX. and within in VIII. In a lenth of 7.87 in., which included the point of fracture the percentages of elongation for the braces were: No. O, 35 per cent.; No. V., 14.5 per cent.; No. VIII., 33.5 per cent.; No. IX., 23 per cent.

The elastic limit and yield-point for these plate specimens were undoubtedly higher than they were in the original plate for the test pieces were straightened cold. In one case (IIIc) a test was made of the plate metal before the strain of the cylinder test, two samples giving an average tensile strength of $\frac{47,646 + 53,050}{2} = 50,348$ lbs. per square inch, and a percentage of elongation of $\frac{19. + 23.3}{2} = 21\ 15$ per cent.

Set beginning about 25,600 lbs. per square inch.

Four strips taken from the same plate (IIIc) after the cylinder test gave an average tensile strength of $\frac{62,012 + 61,443 + 60,731 + 63,433}{4} = 61,904$ lbs. per square inch, and $\frac{17 + 14.5 + 20.5 + 19.5}{4} = 17.9$ per cent. elongation.

Set beginning at 36,980 lbs. per square inch.

This shows that tensile strength was increased some 11,500 lbs. per square inch with a decrease in ductility of 3.25 per cent. by the strains of the cylinder test. The elastic limit was also proportionately raised.

A comparative test of the brace iron exhibited the same difference—as the table of results given above show, viz., an increase of over 5,200 lbs. in tensile strength with a decrease of 7.2 per cent. in elongation.

The relation of pressure to deflection was studied by

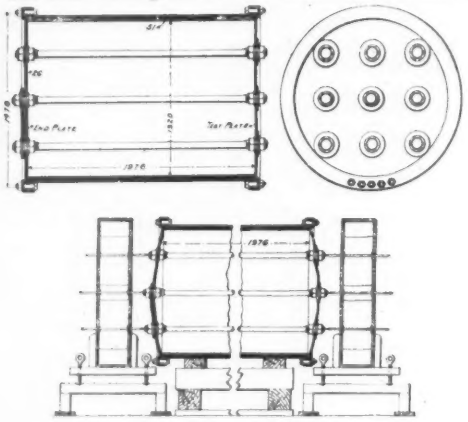


Fig. 3.

means of curves like that of Fig. 7 in the previous article and the average transverse elastic limit and yield-point determined thereby for each plate. In the case of plate IIa no set whatever appeared under 213 lbs. pressure, but it became pronounced under 284 lbs., though no set whatever appeared at the ends of the braces until the pressure had reached 427 lbs. This corresponds to a stress per square inch cross-section of the brace of

$$\sigma_2 = \pi \frac{13.78^2 \times 426}{4 \times 1.917^2} = 28,110 \text{ lbs.}$$ which agress closely with Fig. 8.

According to equation (2)* p. 837, with $c_1 = o$, $c = .962$, $K_2 = 50,470$ lbs. (3,550 kgs.), the working pressure should be

$$p = \left(\frac{.567}{13.78}\right)^2 \frac{50,470}{.962} = 88 \text{ lbs. per square inch.}$$

By (8),† p. 838, with $K_b = 8,500$ lbs. (600 kg.) we get

$$p = \frac{4}{1 - 0.9\frac{.567}{13.78}} \left(\frac{.567}{13.78}\right)^2 8,500 = 92 \text{ lbs. per square inch.}$$

* $p = \left(\frac{s - c_1}{c}\right)^2 \frac{k_2}{c}$

† $p = 4 \left(\frac{1}{1 - 0.9\frac{d}{e_1}}\right) \left(\frac{S}{e}\right)^2 K_b$

Assuming the elastic limit for tension of the plate in its original condition to be the same as that actually found for *IIIc*, or 25,600 lbs., it is found that, inasmuch as the transverse elastic limit for this plate was found to be 284, and as 1 lb. of transverse pressure therefore corresponds to $\frac{25600}{284} = 89$ lbs. tensile stress, 92 lbs. working transverse pressure corresponds to 8,200 lbs. (approx.) hereafter designated by σ_b) which should have been the value of Kb instead of 8,500 lbs. Dealing in the same way with the tensile yield-point, about 34,000 lbs., which corresponds to the transverse yield-point of about 355 lbs., we find that 92 lbs. working pressure corresponds to a tension of 8,924 lbs. (hereafter to be designated by σ^1_b) instead of 8,500 lbs.

Plate IIb differs from the preceding only in the thickness of the plate in test, being 11.3 mm. instead of 14.4 mm. Set began at 213 lbs. pressure and became considerable at 284 lbs.

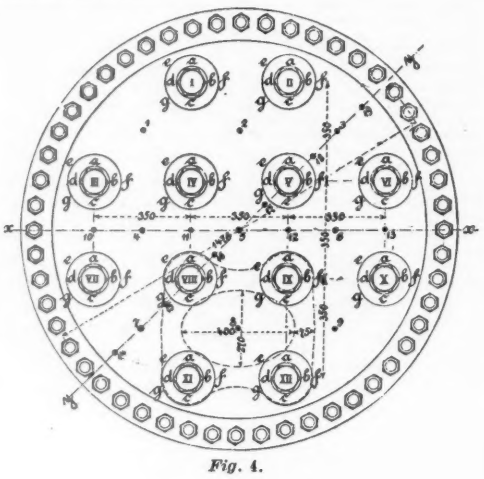


Fig. 4.

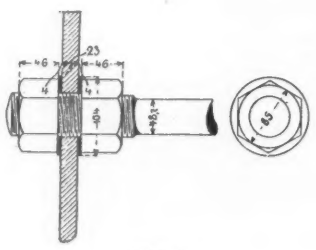


Fig. 5.

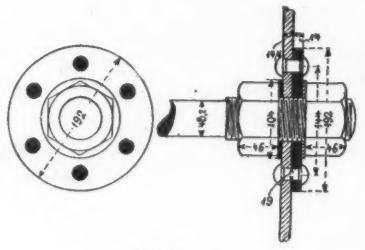


Fig. 6.

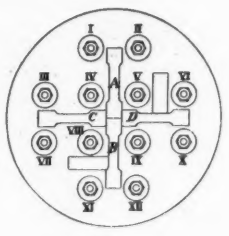


Fig. 7.

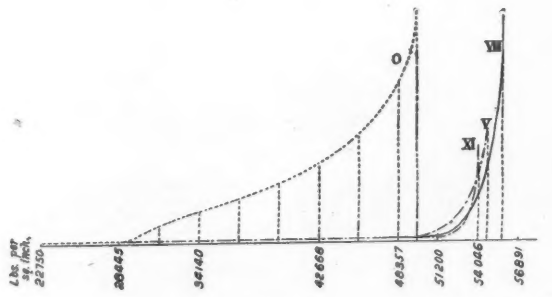


Fig. 8.

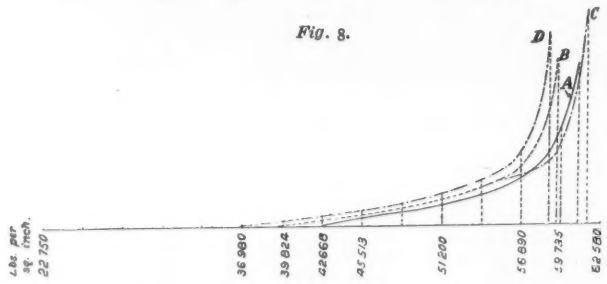


Fig. 9.

$\sigma_2 = 23,360$ lbs. under 355 lbs., the pressure where any set was first observed, and $\sigma_2 = 28,100$ lbs. under 427 lbs. where all braces showed a set.

(2) gives with $c_1 = o$, $c = .962$, $K_2 = 50470$. $p = 55$ lbs.; and
(8) " " $K_b = 8500$ $p = 59$ lbs.

Assuming the tranverse elastic limit to be about 178 lbs. according to observation then $\sigma_b = 8,480$ lbs., and as the transverse yield-point was probably at 249 lbs. $\sigma^1_b = 8,060$ lbs. instead of 8,500 lbs. assumed.

Plate IIc, differs from the preceding in the fastening of the braces, shown in Fig. 10. Set occurred under 213 lbs. to such an extent, that judging from previous observations the transverse elastic limit probably occurred at 185 lbs., and the yield-point at 249 lbs. The strengthening effect of the riveted washer in IIa is made remarkably apparent in the action of this plate, which although of practically the same thickness reached its elastic limit and yield-point much earlier than in the former case.

Equation (2), p. 837, with $c_1 = o$, $c = 1,146$
$K_2 = 50,470$ gives $p = 75.4$ lbs., while
Equation (6),‡ p. 838.
with $K_b = 8,500$ " $p = 74$ " and

the values for the elastic limit and yield-point make $\sigma = 10,000$ lbs. approximately and $\sigma^1 = 10,000$ approximately.

Plate IIIa, Fig. 11 and 12.—The elastic limit in general seemed to be reached at about 270 lbs. pressure, the yield-point at 384 lbs.

The set elongations of the braces occurred irregularly, as the following show:

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
Under 284 lbs.,	.0	001	.0	.034	.0	.0118	.0	.004	.0
313 "	.0	.0078	.0	.0098	.0	.0193	.0	.0098	.0
341 "	.0	.0118	.0	.0196	.0098	.0236	.0098	.0196	.0098
370 "	.0	.0196	.0	.0236	.0236	.0315	.0196	.0295	.0196
398 "	.0098	.0315	.004	.0295	.0787	.0394	.0295	.0394	.0295
427 "	.0196	.0394	.0157	.0394	.1377	.0590	.0394	.0492	.0394

That is, set began in the system as a whole under 398 lbs. pressure, and, therefore, $\sigma_2 = 26,800$ lbs. per square inch. It is to be noted that the center brace, which sustained the heaviest load, when it once yielded, did so rapidly.

Equation (2), p. 837, with $c_1 = o$, $c = .962$, $K_2 = 50,470$, makes $p = 84.9$ lbs., while equation (8), p. 838, with $Kb = 8,500$, makes $p = 86.7$ lbs., and $\sigma_b = 8,196$, $\sigma^1_b = 7,700$.

Plate IIIb, similar to IIIa, but 13.3 mm. thick instead of 16 mm.

Elastic limit at 213 lbs. Yield point at 284 lbs
(2) with $c_1 = o$ $c = .962$ $K_2 = 50,470$ gave $p = 58.3$ lbs.
(8) with $K_b = 8,500$ " $p = 60$ "
$\sigma_b = 7,200$ and $\sigma^1_b = 7,170$. These small values, in all probability, are due to the peculiarity of the design, which furnishes an exceptionally broad and strong bearing for the nuts of the braces; and the thickness of the riveted washer is greater than the plate itself.

In this manner p has been calculated, by both the Hamburg and the author's formulæ, and σ_b and σ^1_b determined for each plate. To avoid repeating results of these calculations, mention will be made now only of such matter as will not be given later in the resumé.

Plate IIIc. Fastening and thickness shown in Fig. 13. Braces spaced as in IIIb.
Elastic limit at about 200 lbs. Yield-point at about 249 lbs.

Plate IVa. Figs. 14 and 15.
Elastic limit at 284 lbs.

Plate IVb. Differs from IVa only in thickness of plate, which is 15.6 mm. instead of 18.3.
Elastic limit at 200 lbs. Yield-point at 270 lbs.

Plate IVc. Fastening shown in Fig. 16. Arrangement of braces as preceding.
Elastic limit at 170 lbs. Yield-point at 213 lbs.

Plate Va. Figs. 17 and 18.
Elastic limit at 177 lbs. Yield-point at 249 lbs.
In this case e is assumed approx. $= \frac{15.44 + 13.50}{2} =$ 14.47 in., then (2) gives $p = 56.9$ and (8) gives $p = 64$.

Plate Vb. Differs from Va only in the thickness of the plate, which is 9.2 mm. instead of 12.2 mm.
Elastic limit at 128 lbs. Yield-point at 170 lbs. e, taken the same as in Va.

Of the tests of the first three plates Ia, Ib and Ic unfortunately only such records are available as to make the calculations possible for the one field whose center is the point 3.

For this single section the calculations give the results tabulated.

Plate Ia, Figs. 19 and 20.
Elastic limit at 284 lbs. Yield-point at 355 lbs.

Plate Ib differs from Ia in thickness of plate, which is 9.4 mm. instead of 12.3 mm.

‡ $p = 4 \frac{1 - 0.7\frac{d}{e}}{1 - 1.8\frac{d}{e}} \left(\frac{S}{e}\right)^2 K_b$

Elastic limit at 178 lbs. Yield-point at 284 lbs.

Plate Ic, Figs. 21 and 22.

Elastic limit at 178 lbs. Yield-point at 249 lbs.

RESUME.

The results obtained for these plates are tabulated here for sake of comparison:

Plate.	p by equation (2)	p by equation (8) or (6)	σ_b	σ_b^1
Ia.	88	91	8,200	8,720
Ib.	51.2	54	7,780	6,480
Ic.	72.5	71.2	10,200	9 720
IIa	88	92	8,200	8,730
IIb	54.7	59	8,192	7.800
IIc	75.4	74	10,000	10,000
IIIa	84	86.7	8,196	7,700
IIIb	58.3	59.8	7.200	7,170
IIIc	71.1	69.7	8,795	9,560
IVa	86.7	89.6	8,040	.....
IVb	62.6	65.4	8,400	8,260
IVc	72.5	69.8	10,400	11,100
Va	56.9	64	9,260	8.750
Vb	32.8	36.9	7,390	7.390

It is seen from the values obtained for σ_b and σ_b^1 — calculated values of K_b whose accuracy depends on the correctness of certain assumptions of the elastic limit, yield-point, etc.—that the calculated working pressures for plates *Ic*, *IIc*, *IIIc* and *IVc* are too high, always giving a modulus of proof strength nearly 1,500 lbs. higher than they should. On the other hand these values for *Ib*, *IIb*, *IIIb*, *IVb* and *Vb* are too low. In the latter cases the riveted washers were thicker than the plates themselves to the following extent:

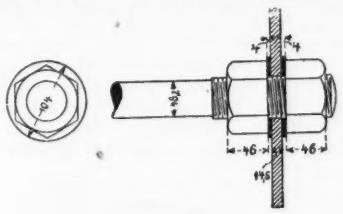


Fig. 10.

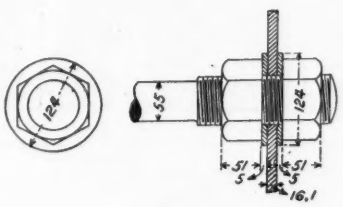


Fig. 13.

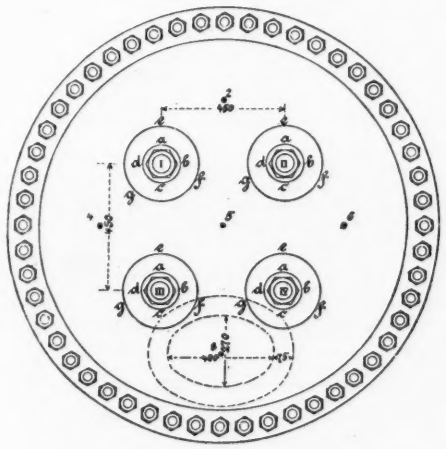


Fig. 14.

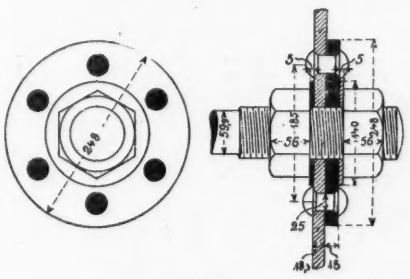


Fig. 15.

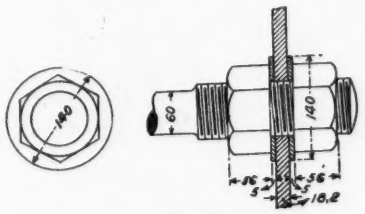


Fig. 16.

	Ib.	*IIb.*	*IIIb.*	*IVb.*	*Vb.*
$s_1 - s =$	.10″	.11″	.12″	.08″	.11″

For cases like *Ic*, *IIc*, *IIIc* and *IVc*, μ is apparently not taken large enough, assuming $\mu = \frac{5}{8} = .555$ (6) becomes

$$(6a) \qquad p = 3.6 \frac{1 - 0.7\frac{d}{e}}{1 - 1.8\frac{d}{e}} \left(\frac{s}{e}\right)^2 K_b.$$

For cases like Fig. 2 with $s_1 = .75s$ to s the value $\mu = \frac{1}{2}$ seems sufficient.

From what has been said in the foot-note, page 838, it

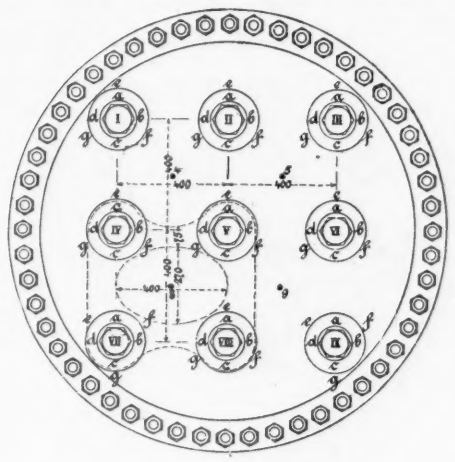


Fig. 11.

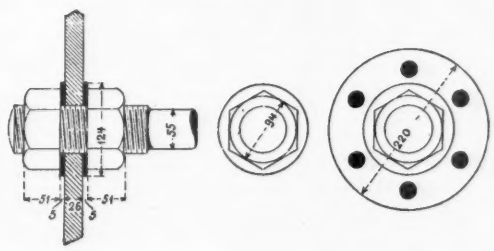


Fig. 12.

Fig. 17.

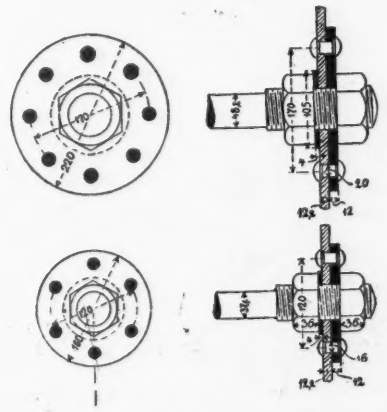


Fig. 18.

would seem best perhaps, in the case of such plates as *Ib*, *IIb*, *IIIb* and *Vb* to put in place of equation (12), p. 838, $\frac{1}{2} e^2 p (\frac{1}{3} e \sqrt{\frac{1}{2}} - 0.21 d_n) \mu = K_b \frac{\theta}{e_2}$, in which θ is the moment of inertia of the cross-section concerned (Fig. 23) with reference to the horizontal axis, through its center of gravity. And

$$\theta = \tfrac{1}{12}(e\sqrt{2} - d)\, s^3 + (e\sqrt{2} - d)\, s\, (e_1 - .5\, s)^2 + \tfrac{1}{12} (d_n - d)\, s_1^3 + (d_n - d)\, s_1\, (s + .5\, s_1 - e_1)^2$$

e^1 being the distance of the bottom fibers from the axis and therefore equal to

$$\frac{(e\sqrt{2} - d)\, s.\, \frac{1}{2} s + (d_n - d)\, s_1\, (s + \frac{1}{2} s_1)}{(e\sqrt{2} - d)\, s + (d_n - d)\, s_1}$$

$e_2 = (s + s_1 - e_1)$ is the distance of the farthest fiber from the axis. Accordingly

$$p = \frac{8.5}{e^2 (e - .9\, d_n)\, \mu e_2} \theta K, \text{ or when } \mu = \tfrac{1}{2}.$$

$$(8a) \qquad p = \frac{17}{e^2 (e - .9\, d_n)} \frac{\theta}{e_2} K_b,$$

a formula which should be used when $s_1 > s$ in place of (8). (8) is to be used when $s_1 \leq s$.

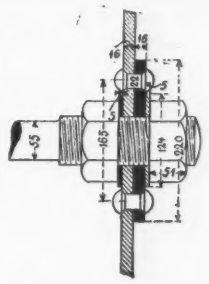
Regarding the choice of K_b the following should be borne in mind: That the deterioration by rust, etc., has its effect on the thickness of the plate, which should be increased, therefore, to an extent depending on the s circumstances.

That appreciable set in wrought iron or soft steel boiler plate will occur at about 25,600 lbs. pull per square inch, and the yield-point at about 34.000 lbs. per square inch. The value of K_b = 8,500 lbs. in the new formulæ will give a factor of safety of at least 3. The author believes that with first-class boiler plate K_b can be taken as high as 11,500 lbs. (800 kg.) with safety.*

Bulged plates possess the increased strength of arches over flat forms, but it should be borne in mind that then the dubtility of the plate has suffered by the overstraining that produced the bulge.

Some Former Wabash Officers.

The address made last week by Col. W. H. Blodgett, General Solicitor of the Wabash, when Mr. C. M. Hays, late General Manager of the company, was presented with a gold watch by his associates, before leaving to take up his new duties as General Manager of the Grand Trunk, gave a list of former Wabash officers now holding responsible positions on other roads, or in public service. As Colonel Blodgett's address was of as much general as personal interest, we publish an abstract of it. The whole affair seems to have been most pleasant, and one of those occasions, rather less frequent in this country than in England and Germany, but which, signalizing some change in a career, lead one to consider, whether there is any greater success than to win the good will and esteem of one's associates. The meeting was attended by about 150 Wabash officers, and served to introduce Mr. Joseph Ramsey, the new General Manager of the Wabash.



Colonel Blodgett said: "Sometimes people express their feelings by words, sometimes by their actions, and nothing I could now say would more clearly express to Mr. Hays the esteem in which he is held by his associates on the Wabash, than the mere presence of those here today, to bid him 'God-speed' and an official 'Good-bye.' I see here those with whom I have been associated on the road for more than twenty years. In that time we have seen many managers come and go, but none ever came to us as did Mr. Hays and none has ever left amid such spontaneous expressions of regret. Of all our General Managers he is the only one who grew up, as it were, among us.

"As a property the Wabash has experienced many vicissitudes of fortune. If it has not always made money, it has always been making men. It will be a matter of some surprise to those who have not before thought of it, to know that to-day the traffic on more than 38,000 miles of railroad, which is equal to over 20 per cent. of all the railroad mileage of the United States, is practically controlled by men who have grown up and largely learned their business on the Wabash. Let us recall them: W. F. Merrill, Second Vice-President Erie Railroad; W. C. Van Horne, President and General Manager of the Canadian Pacific; Roswell F. Miller, President and General Manager of the Chicago, Milwaukee & St. Paul; Geo. W. Stevens, General Manager of the Chesapeake & Ohio; C. H. Chappell, General Manager of the Chicago & Alton; John M. Egan, recently President of the Chicago Great Western; C. W. Bradley, General Superintendent of the West Shore; C. H. Ackert, General Manager of the Elgin, Joliet & Eastern; Walter Morcom, General Manager of the Mexican Southern; C. F. Meek, at one time General Manager of the Denver, Texas & Fort Worth; K. H. Wade, General Manager of the California Southern; Geo. H. Nettleton, after aiding in its construction, left the Wabash and became General Manager of the Kansas City, Fort Scott & Memphis; C. K. Lord, Vice-President of the B. & O.; A. C. Bird, General Traffic Manager of the Chicago, Milwaukee & St. Paul; H. C. Townsend, after long service, left the Wabash to become General Passenger and Ticket Agent of the Missouri Pacific; John M. Chesebrough, General Passenger Agent of the B. & O. Southwestern; Geo. H. Daniels, General Passenger Agent of the New York Central; T. B. Burnett, Vice-President and General Manager of the Los Angeles Terminal; J. V. Goode, General Superin

* The author in this connection directs attention to American practice, particularly that of the P. R. R. whose extensive experience in locomotive service should justify their practice which according to his formulæ makes K_b = 11,500 lbs.

tendent, Fort Worth & Denver City; W. J. Allen, Assistant General Manager of the Chicago, Rock Island & Pacific, and L. M. Martin, who left the Wabash to become General Manager of the Iowa Central. All those have gone out from the Wabash to take positions on other roads, but the list does not stop there. While they have left us to enter the service of other companies, others have been called to participate in the affairs of government, both state and national.

"A few years ago a Wabash engineer (T. J. Hennessy) was called from his engine to become a Railroad and Warehouse Commissioner of Missouri, and later on a Wabash conductor (Joseph Flory) was taken from his train to succeed the engineer. A Wabash man (C. F. Lape) was taken from our shops at Springfield to become a Railroad and Warehouse Commissioner in Illinois, and Wm. Kirkby, a Wabash conductor, has been for years the Railroad Commissioner of Ohio.

"In the Legal Department many of our attorneys have been sent to Congress, and one was made a Federal Judge. The present Assistant Attorney-General of Missouri (Morton Jourdan), the present Assistant Postmaster-General of the United States (Frank Jones), and the present Assistant Secretary of the Treasury of the United States (Scott Wike) all severed their connection with the Wabash to accept their present offices. And looking back over this long list of names it can be said with truth, that not one of them, either in his relations to the road or to the public, has ever betrayed a trust."

Tramrail Systems for Conveying Material.

While overhead, power and hand traveling cranes are the machines most commonly used for rapid and economic handling of material, the construction of the building in which the cranes must be placed or the special nature of the work to be done, make it practically impossible in many cases to use them to advantage, and under these conditions the overhead tramrail system is often found to be the most practical means, especially where it is necessary to convey material around curves, from one room to another, or from one building to another.

Figs. 1, 2 and 3 show the general style of tramrail construction made by the Brown Hoisting & Conveying Machine Co., also the methods by means of switches and turn tables, of transferring from one line to another The switches and turn tables are operated from the floor by means of pendent hand chains, which, if they are found to hang in the way, may be carried to brackets fastened to the nearest wall or post. The switches and turn tables are built for any capacity up to three tons, and are designed with special care for safety, being fitted with automatic safety stops and locks, making it impossible for the trolley to run off the rail, through an open switch, while transferring from one line to another. Standard trolleys and rails are built up to 10 tons capacity, the trolley frames being made of cast or wrought iron, depending on the service and capacity for which they are intended.

On account of the special patent key bolts used for supporting the rails, which are steel I-beams, the size depending on the capacity and span between supports, it is possible to make the trolley wheels of very large diameter, taking up the entire available height between the bottom and top flanges of the beam. Trolleys of one ton capacity or over are usually fitted with roller bearings, which in conjunction with the large diameter wheels reduces the traveling resistance to a minimum. Wrought iron or steel joints are furnished for joining the rails, and stops are provided for the ends of the runways. Cast-iron or wrought iron hangers are used for supporting the tramrail where the rail is not bolted directly to the overhead timbers, and where it is necessary to drop below the overhead supports in order to clear obstructions, such as shafting, pulleys, belting, etc.

The Brown Hoisting & Conveying Machine Co. has recently built and erected such a system as that just described, of one ton capacity, in the new warehouse of the National Tube Works Co., Clark and Taylor streets, Chicago, to facilitate the unloading and handling of iron and steel pipe.

This system consists of about 650 ft. of 7-in. 46½ lbs. per yard steel, I-beams for the track, 6 curves and switches, 6 Brown, roller bushed, 1 ton, trolleys, four of which are equipped with 1-ton Weston triplex pulley blocks, and two with ½-ton blocks of same pattern; all with the necessary length of chain for hoisting from ground floor. The tramrail is supported by the roof timbers about every 15 ft. Where such supports come under 8-in. × 12-in. timbers they consist of small steel channels placed parallel to each other, with cast-iron separators between them, which are fastened to the timbers by lag screws. The wrought-iron strap hangers, which in their turn support the I-beams constituting the tramrail, are fastened to the channels by means of bolts. Where the point of support for the tramrail comes directly under heavier timbers, say 10 in. × 12 in., the channels just mentioned are not used, but the wrought-iron hangers are fastened to such heavy timbers by bolts running clear through the latter. Both means of support are simple and strong.

Figure 4 shows plan of the ground and second floors of the warehouse and the arrangement of the tramrail system therein. As shown in Fig. 4 the rail runs the entire length of each driveway, so that pipe can be unloaded from carriers into wagons or into storage rooms on ground or second floor on each side of each driveway. Large doors at street end of each driveway allow free passage of wagons into and from warehouse. A railroad track, from main tracks, running the entire length of warehouse, permits the switching of several cars of pipe into the warehouse. The tramrail switches at point *x* are operated by hanging chains with handles running to posts *a*, which chains can be operated from either the ground or the second floor.

Fig. 5 illustrates the cradle or carrier, designed by the National Tube Works Co., used in conveying pipe from cars to storage rooms or wagons, and vice versa.

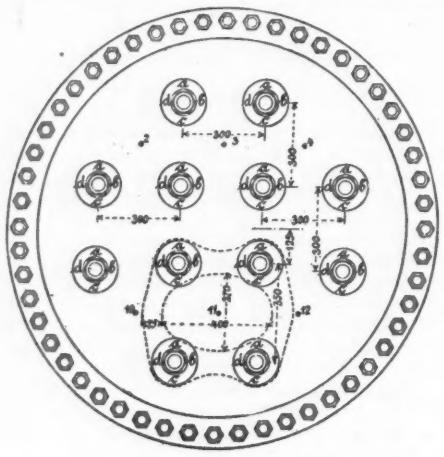


Fig. 19.

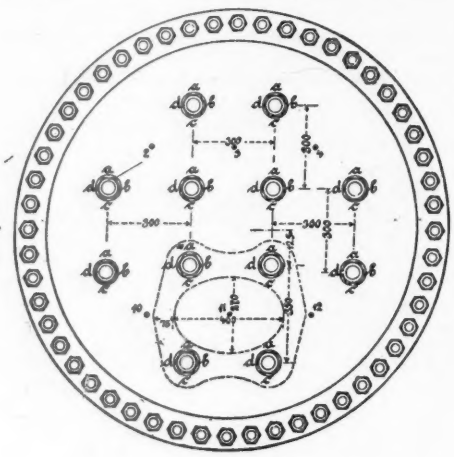


Fig. 21.

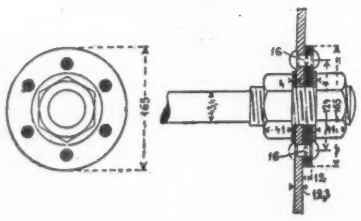


Fig. 20.

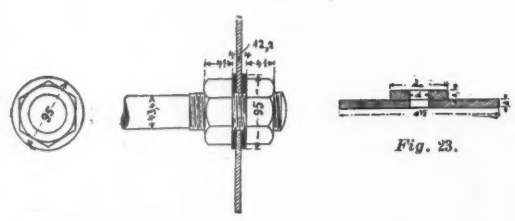


Fig. 22.

Fig. 23.

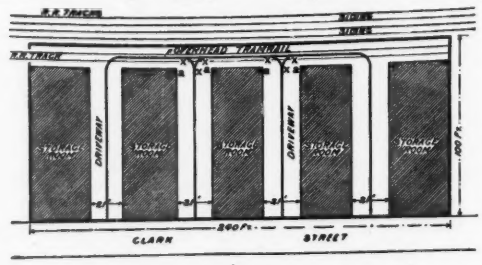


Fig. 4.—Arrangement of Overhead Tramrail in a Large Warehouse.

Pittsburgh as an Iron Center.*

Pittsburgh is the iron city and the glass city of the continent, and she has neither iron ore nor glass sand in her borders, nor within many miles, the nearest source of iron is east of the mountains, and the favorite source is away off at Lake Superior. The unrivaled location makes her commence sure, and the great Pittsburgh coal seam makes her supremacy as a manufacturing center safe. For gas, for steaming, and for domestic use Pittsburgh coal is unrivaled in quality, in quantity and in cheapness. Within 50 miles, the great Connellsville seam provides a coal that makes the best and the cheapest coke in the world.

All around her petroleum is found in great abundance, and natural gas in such unlimited quantities that for a few years she was known as the beautiful Gas City; thousands of people flocked in to take advantage of this gas, and the staid, solid old place came near to being degraded into a common boom town with a mushroom growth. By the most vigorous energy and by the most astounding wastefulness, this steady, thrifty, conservative old Scotch-Irish town soon dissipated this ephemeral monstrocity of fuel, and once more we are under our good old cloud of smoke and plodding along in our grime and ashes. Are we penitent, sorry for this outburst of extravagance? It is doubtful; it is not clear that the gas brought any lasting or even much tempor-

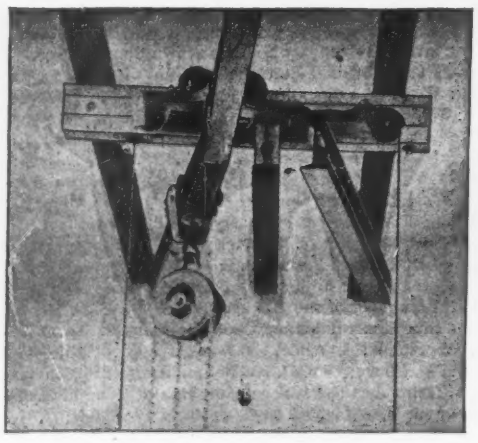


Fig. 2.—Double Switch.

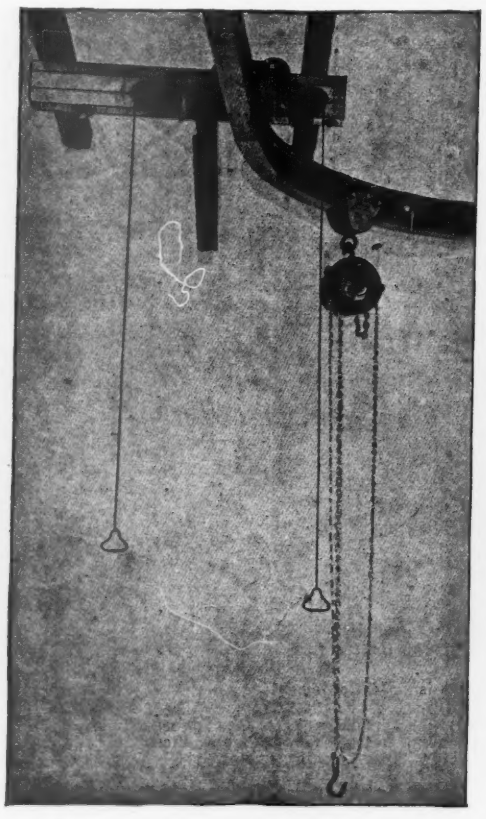


Fig. 1.—Single Switch.

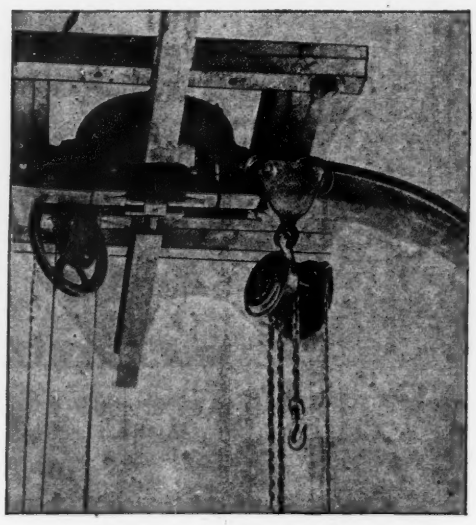
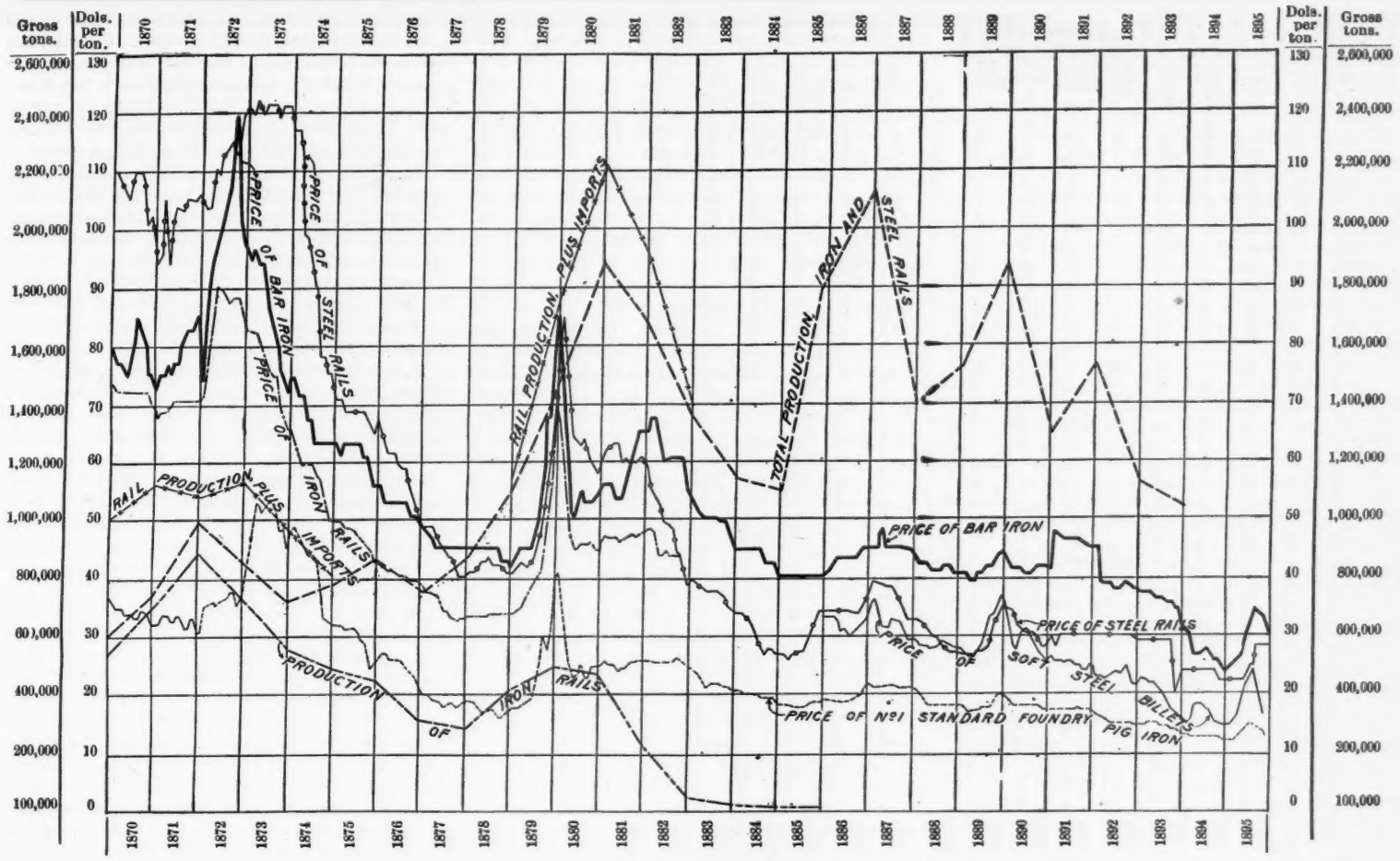


Fig. 3.—Turn Table.

* An extract from an article by Mr. Wm. Metcalf in the *Iron Age*.



Fluctuations in the Prices of Iron and Steel Rails, Billets and Pig Iron and in the Production of Rails.

From the Iron Age, Jan. 2, 1896.

ary benefit to Pittsburgh. If we were extravagant in its use when we had it, we were absolutely riotous in our rush to give away every cent of profit there was in it. As soon as a man got the first gas jet into his mill he rushed out to the rest of the country and downed his prices in hope of extending his buisness and of gathering in some other fellow's trade; it is an every man for himself community, and very little of the benefit of natural gas remained in it. This rush soon exhausted the surplus of gas; it costs something now to use what there is, and we are going back to coal; we have saved ourselves from a mushroom expansion, and we are on a solid foundation again; we know what coal is, we know what to do with it, we know how much there is of it and we can again persue the even tenor of our way with no fears of the future.

Pittsburgh is to-day the greatest pig iron producing center in the country. . . . Far-seeing men calculated that it was probably cheaper to bring iron ore to the fuel than to transport the more bulky fuel to the ore; accordingly, in 1859-60 Graff, Bennett & Co., built the Clinton furnace, the real pioneer blast furnace of Pittsburgh. It was a decided success from the beginning, and it has been followed up until Pittsburgh leads in the manufacture of pig iron, as she always did in the production of wrought iron.

In the early sixties the manufacture of crucible steel was established here, Smith, Park & Co., and Hussey, Howe & Co. being the real leaders; and again the pluck and energy of the Pittsburgh men brought success, and soon made this the leading point in this great industry. Soon after the firm establishment of the crucible industry Andrew Carnegie, a railroad man and a manufacturer of structural iron and bridges, looked out ahead and saw the advantages of this place for the production of rails and other heavy railroad material by means of the then infant Bessemer process. Seizing his opportunity, the secret of his great fortune, the Edgar Thomson Steel Works were built and operated with brilliant and substantial success from the beginning.

But is Pittsburgh the best place, the most economical in which to produce pig iron and the iron and steel which are made from it?

Our largest manufacturer and greatest philanthropist, Andrew Carnegie, says no; there are other places where pig iron can be made cheaper than here, and that Pittsburgh has lost her supremacy in this great industry. He urges the community to use every effort to build a ship canal in order to cheapen transportation and restore to Pittsburgh her lost place. This is wise, whether pig iron can be made cheaper elsewhere or not, it is clearly eminently wise to strain every energy toward cheapening means of exchange, even if those existing are better than any others.

On the other hand, Mr. Carnegie's industries are all here; out of them he has produced millions, apparently just that he might have the pleasure of giving them away again; and at the present time he is building the largest and the most improved blast furnace plant that science can devise. He has given away millions for pleasure, but it is not known that he ever built a furnace for the mere fun of the thing. Readers can draw their own conclusions.

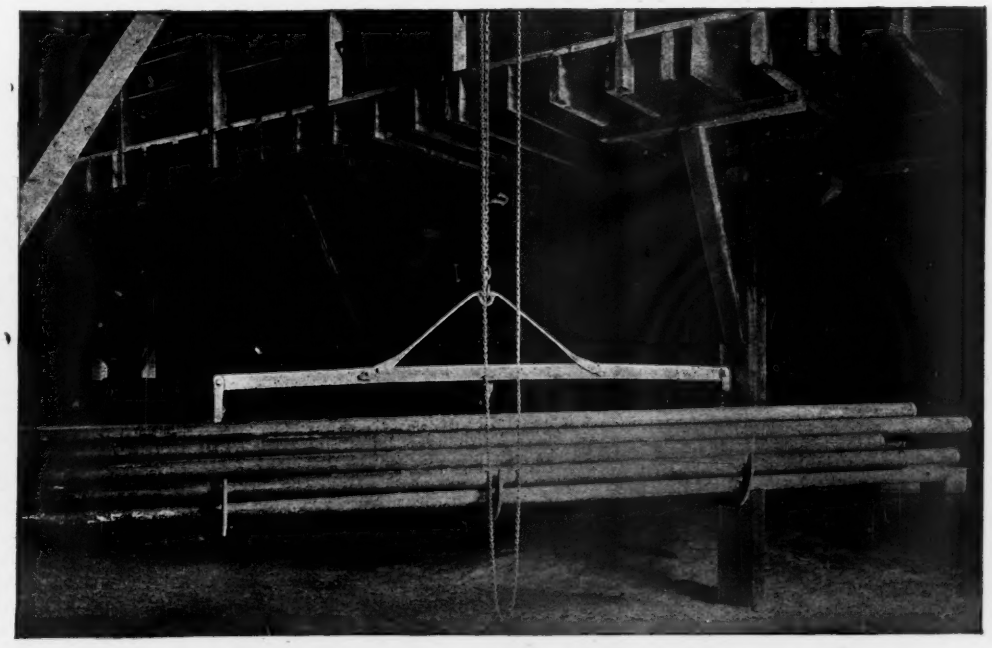


Fig. 5.—Cradle for Carrying Pipe, Used with the Brown Hoisting & Conveying Machine Co.'s Overhead Tramrail.

Tensile Tests of Cast Steel.

We publish below a table showing the results of tensile tests of 15 specimens of cast steel. These castings were made by the American Steel Casting Co., of Thurlow, Pa., for use in the Buffington-Crozier disappearing carriages, being built for the Ordnance Department of the United States Army. The results would be remarkable for the best forgings, and for steel castings they are considered by experts as really extraordinary. The figures published are duplicates of those which appear on the report of Capt. D. A. Lyle, Ordnance Department, United States Army; and Captain Lyle, in signing the report, offers his congratulations. The results here shown cover castings produced from five different heats, indicating remarkable uniformity. The length of stem of the test piece was two inches, and in each case the fracture is noted as silky, and all of the specimens were accepted.

STEEL CASTINGS MADE BY THE AMERICAN STEEL CASTING CO. FOR THE ORDNANCE DEPARTMENT, U. S. A.—TENSILE TESTS.

Elastic limit.	Tensile strength.	Elongation after rupture.	Reduction of area after rupture.
Lbs per square inch.	Lbs. per square inch.	Per cent.	Per cent.
30,000	67,000	28.8	46.3
32,000	68,500	29.0	47 8
30,500	67,000	30.6	52.8
30,500	70,500	29.8	41.0
33,500	72,500	27.2	42.5
30,500	65,500	29.8	44.9
30,000	65,000	30.5	54.1
32,000	69,500	27.0	48.6
29,000	65,000	26.0	50.0
30,000	65,000	30.2	51.1
30,000	68,500	28.3	42.2
30,000	65,500	26.0	50.9
33,500	68,500	31.3	43.7
29,500	66,500	29.2	48.0
32,500	69,000	28.0	41.9

New Car Ferryboat for Lake Michigan.

The Flint & Pere Marquette Railroad has let a contract for a ferryboat to run between Ludington, Mich. and Manitowoc, Wis., which will cost about $300,000. It is to carry 30 freight cars, and will be built by F. W. Wheeler & Co., of West Bay City, Mich. The length of the boat between perpendiculars will be 331 ft., over all 350 ft., beam 56 ft., depth below main deck 19½ ft., depth from upper deck to floor 37 ft. The steel frames and plating will extend from bilge to upper deck and the main and upper decks also are to be of steel. The bow is to be doubled-plated with ¾-in. plates for a distance of 30 ft. abaft the stem, and this double plating will extend 3 ft. above the load line.

The steamer will have three fore-and-aft compound engines of equal power, each with 24 and 48-in. cylinders and 36-in. stroke. One of these engines will work the bow wheel, the other two the stern wheels. Steam will be furnished by four boilers, each 13½ ft. in diameter and 12 ft. long. The wheels are to be of steel, the two after of 11 ft. and the forward one 9½ ft. diameter. The upper works will be of wood. There will be a cabin with accommodations for 25 passengers and a house abaft the smokestacks to provide quarters for the crew. The smokestacks will be set fore and aft, as in other car ferry steamers. The vessel is to be finished next October and it will require 2,700 tons of steel.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
Published Every Friday
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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The controversy over freight rates on steel rails from Pueblo to San Francisco, which has been the subject of inquiry by the Interstate Commerce Commission and was reported upon by that body Nov. 25 (*Railroad Gazette*, Dec. 20, p. 848), seems to be one in which the shippers and the railroads *almost* agreed; and the decision of the Commission, the full text of which is now issued, appears to be based as much on that consideration as anything. The fact that the Atchison has, for a reason largely sentimental, complied with the order to reduce its tariff, tends to confirm this view. Rails go from New York to San Francisco by water and this reduces the all-rail rate; this reduces the rate from Chicago because Chicago mills can send to New York or New Orleans at low rates; and so the rates from Chicago and Kansas City have also been pulled down; and these rates have been on a low basis for so long a time that the Commissioners evidently think it is high time the roads gave some one else a chance. It does not appear whether the Colorado Fuel and Iron Company ever sold a single pound of its products in California, but on the showing that the rate it asks for, 40 cents per 100 lbs. on rails (33 cents on other articles), is no lower than the roads are already accepting, for the same distance, on rails coming from farther East, and that a rate tending to help the Colorado mill would be good for the community and the prosperity of the community, good for the railroads, the reduction is ordered. The whole reasoning of the Commissioners, so far as it can be discerned, is evidently based on the same general idea that first produced the long and short haul law in Massachusetts and other States 20 and 30 years ago; it looks bad to constantly maintain great disparities in rates over the same line, and we won't have it! If a railroad wishes to compete with ships let it show its good faith by launching its locomotives into the ocean and let them swim: there they can compete on even terms and without rasping the feelings of the voters who live along the line of the railroads. This sentiment is so strong and deep-seated that it is often politic for a railroad to comply with it, even where good business arguments can be shown for charging less for a long haul than a short one; and that seems to be the conclusion that the transcontinental roads have about reached in this case. It is not impossible that the competitors of the Southern Pacific will be glad to see a forced reduction, for some of the testimony in this case tends to show that that road encouraged shipments by way of New Orleans because it could in that way get a longer haul. The rates ordered by the Commission are about 12 per cent. higher than those asked for by the complainant.

We call especial attention to the paper by Mr. McConnell on "Locomotive Service" published on another page. Mr. McConnell's argument is that freight locomotives ought to do more work, and that the way to make them do it is to base the reports of locomotive service and locomotive cost on ton-miles of work and not on miles run. We have taken occasion in times past to call attention to the impossibility of making useful comparisons of locomotive work and locomotive costs based on reports of miles run, which, unfortunately, are about the only reports that one can ever get hold of. Mr. McConnell says that after four years' experience with tonnage rating, on grades running from 40 to 96 ft. to the mile, there has been a general increase in the average number of cars per train. On heavy grades trainloads have been increased from 22 cars to 26 with the same engine. In another case a train of 28 cars has been raised by the tonnage system to 35 loads with the same engine. The trainmen believed that the engine could not pull 35 loads, but tests showed that it could, and no trouble was found in hauling a train of 1,100 tons. It is Mr. McConnell's opinion that every locomotive in freight service on the Western roads can be made to earn at least $4,000 a year more than it is now earning, with no increased outlay except that for fuel. His statement of the problem is: "How much does it cost to haul a ton of freight one mile; not what does it cost per mile to run your locomotives?" We shall look with interest for the discussion of this paper before the Western Railway Club, and meantime will suggest that many reports of the results of actual trials of the system of tonnage rating will be found in the pages of the *Railroad Gazette* in the last two or three years; and we look forward to the day when accounts will be kept making the unit of efficiency and of cost the ton-mile and not the engine-mile.

There was a rear collision of passenger trains in the tunnel at St. Louis on the evening of December 31 which was more than ordinarily deplorable. A signalman reported that the block section was clear when it was not and a Pullman sleeping car was smashed and a fireman killed. That no passengers were killed seems to have been simply a piece of good fortune. This tunnel is a part of the main approach to the St. Louis Union Station, being traversed every day by the numerous trains that go over the Eads Bridge, and so serious an accident will naturally make a good many people nervous. The negligent signalman had been in the service of the road three years. He is supposed to have fallen asleep, and, as the train *ought* to have passed him, he assumed that it had passed, when, in fact, it had been detained in the tunnel by some trouble with the air-brakes. The only reason given for depending upon the simple telegraph block system, without any electrical connection between the signals, on such a dangerous piece of road, is that automatic signals (presumably track circuit) had been tried (some time ago), but had proved inefficient. Whether this is the true reason or not, the plain lesson is that something more than simple telegraphic connection between operators is demanded. If we may judge by the experience and testimony of the officers in charge of the Fourth Avenue tunnel, New York City, track circuits from one block station to another are not only practicable but highly desirable; they use them throughout the tunnel, in addition to the very elaborate Sykes instruments, and are preparing to use them on two miles of four-track road just north of the tunnel, where the rails are *laid on metal sleepers*. It is true that in the New York tunnel very thorough inspection is maintained, but the same is practicable at St. Louis. Even if track circuits are not feasible at St. Louis it is still unwarrantable to depend upon a single safeguard, for the Sykes locks without track circuits, the Hall wire-circuit automatic and other automatic signals are available.

The Railroads and the Erie Canal.

We have long been taught to think that waterways are necessary to control railroad rates. Now it appears that the public must look to the railroads to protect it against the monopolistic and extortionate canal boatman. Last spring the railroads reduced rates on grain from the Lakes to New York so low that the canal boatmen were almost driven out of business and they have been complaining ever since of the wicked railroad companies. Of course some motive more obscure than the desire to get traffic when traffic was scarce, and when a great deal of equipment was idle, must be attributed to the railroads and it has been said over and over again that they banded together to ruin the canal business. This childlike theory, that the railroads would throw away great sums to ruin the canal, has been accepted by the Superintendent of Public Works of the State of New York, who says in his annual report:

"The motives which actuated the railroad lines through this State were probably of a mixed character and can only be surmised." But there must have been "some ulterior motive." The shrewd Superintendent is not to be beguiled. He can see through a ladder and thus exposes the machinations of the railroads: "By legislative enactment the question of the appropriation of $9,000,000 for the improvement of the canals was to be submitted to a popular vote of the people of the state in November last. As railroad corporations are not in any sense benevolent institutions, it may well have dawned on the minds of the managers that if the usefulness of the canals could, before the vote in November, be discredited by an overwhelming reduction in its trade and tonnage, the people would negative the proposed appropriation and thereby consign the canals to a position of desuetude."

What is to be done? How can the railroads be forced to hold up rates to a point where the canal mule can live? This question the Superintendent does not answer, but he will probably bring the matter to the attention of the State Railroad Commissioners. We might, however, suggest that there were certain plain conditions that led to the reduction of rates and that the ingenuity of the Superintendent was wholly unnecessary.

For example, one or more railroad companies own costly elevators in New York which they must keep running, even if the grain traffic falls off 90 per cent. The grain movement to New York last Spring was much smaller than before for many years and a road owning an elevator might well choose to carry corn at cost rather than lose money on the elevator. Taking the grain by rail left the boats and boatmen idle; but if it had gone by canal hundreds of freight cars, enginmen and trainmen would have been idle; was it not plain business wisdom for the railroads to look out for their own men and property? Some boatmen claimed that the railroads took grain at *less* than cost just out of spite. Railroads are sometimes justified in doing business at a loss, because they would suffer greater loss by letting their facilities stand idle; but in this case, we suspect that they made a profit. In carrying wheat from Buffalo to New York at 2⅜ cents a bushel, the New York Central would receive 1.8 mills per ton per mile; but if it can carry 1,800 tons in a single train, as we believe it can, it would still earn a good deal more (per train) than the average freight train earns in New York state.

Railroad Rates and Railroad Employees.

An article on another page ought to be of a special interest to railroad employees. It brings out one result of the decline in rates, and of the shrinkage in revenue due to low rates and diminished volume of traffic, which affected them particularly. It will be observed that the severe reduction of expenses made necessary in 1894, resulted in the discharge of about 94,000 railroad employees—really a pretty big army thrown out of work; and probably it is not too much to estimate that 400,000 people, being these men and their dependents, were directly affected. It is no wonder that there was suffering and discontent; but this was only the beginning. These people were no longer able to buy as they had done, and their adversity affected merchants, manufacturers and farmers all over the land.

And still we have not done with this disagreeable investigation. In 1893 there were about 874,000 men employed on the railroads of the United States. In 1894 this number had fallen to about 780,000. In 1892 there were over 821,000, and in 1891 over 784,000. In 1894 the number of employees should have been, by natural growth, about 920,000, instead of 780,000. But not only were the numbers of those employed decreased, the incomes of those who remained were lowered. There was a general cut of wages in all grades of the service; the 5,000 general officers suffered as well as the 180,000 trackmen and 150,000 shopmen. Wages were lowered directly, and time was reduced, bringing about the same result indirectly. Something like 3,000,000 people, besides those actually discharged and their dependents, found themselves less able to buy necessaries of life.

These figures show what an army of voters there is in the United States, who have a personal interest in helping to maintain railroad rates and it does not take much imagination to multiply this army indefinitely, by tracing out the effect of their prosperity upon the immense and varied industries which depend largely upon the railroads. Of course, we do not assume for a moment that the shrinkage in railroad revenues in the last two years was due entirely to the decline in rates, but the present very narrow margin between profit and loss in railroad working is to an immense degree dependent upon that one condition. We should suppose that this is a fact that railroad employees would sometimes reflect upon, and that they would have it in mind when the time comes around to elect lawmakers, either state legislators or members of Congress.

The day has long passed when any well informed

man fears that rates will be unreasonable, except in a very few peculiar and restricted cases. There are several vast forces working to prevent this—not only the forces of competition, but other great forces of commercial and industrial life. The modern railroad man knows that rates must be reasonably low to develop traffic, to make production and trade possible, to build up communities and territories. He knows that he can never again do a small business at a big profit, but must do a big business at a small profit. Therefore, one no longer fears high rates. The dangers left are unjust discrimination and unreasonably low rates. The first oppresses the producer and consumer. The second brings ruin to the railroads and to the great interests whose life depends on the prosperity of the railroads. But the lesson of legislation is that discrimination and low rates are not to be corrected by laws, but by the railroads themselves. To this end the railroads must act, and act together, and this the law-makers are afraid to allow. Many of them have learned the lesson of the failure of laws to restrain the ignorant and dishonest railroad officers and their success in hampering the honest and intelligent; but even those lawmakers who have learned this lesson are still afraid of an ignorant public opinion. Instead of trying to educate their constituents they are trimming to what they think is the popular mood. This is the lesson of "politics." There is no such coward as the man who has become the slave of the mob.

It remains therefore for the voters in the rank and file of railroad life to educate their representatives in legislatures and in Congress. When these voters let it be known that they intend to vote for good wages and steady employment in their own business, their representatives will take the hint promptly enough. To-day not a man in the United States Senate dares to raise his voice against the wanton attack of a charlatan on the joint traffic agreement and on the members of the Interstate Commerce Commission. The senators are scared to death by a monster which they have built up in their own imagination and which they label public opinion. Perhaps the 800,000 voters who live on railroad wages can gradually stiffen the backs of those lawmakers who know but do not dare, and instruct those who neither know nor dare.

A Year of Unstable Rates.

The history of the human race, as written, has been characterized as chiefly a chronicle of wars and bloodshed; and the history of the doings of the traffic officers of the principal railroads of the United States during the year 1895 will be found to be not greatly different from general history. It is true that mankind has made progress chiefly by pursuing the arts of peace between times, and that the perspective of our histories is wrong, in so far as it lays too much emphasis on victories and defeats, noise and disaster; and the gloomy traffic history of 1895 may also be lightened by the reflection that the wars that we read of do not, after all, affect more than a moderate percentage of the traffic by which the railroads make a living; the great bulk of their work is done under something like normal conditions. The traffic men have to give to this commonplace business a good share of their energies, but it is not the kind of business that gives rise to discussion.

The rate situation will be found set forth in brief compass week by week in the issues of the *Railroad Gazette*, largely in the letter from Chicago, printed in our traffic columns. At the very beginning of the year the situation at Chicago was bad, and open reductions of five cents and more on grain to the Atlantic seaboard were reported Jan. 16. By another week matters were "very bad." Demoralization ontinued all the first half of the year, but did not attract so much attention as would naturally be expected, on account of the small quantity of freight moving and the general feeling that there was no way of putting an end to the irregularities. Rates from Chicago to the Southwest were the subject of a lively war, and by June the Texas freight traffic was being carried at ridiculously low prices. The condition of things between Chicago and the Atlantic seaboard was improved by the meeting of Presidents at New York about July 1, and from that time until about the 1st of December freight rates in this territory were probably better maintained than before for several years; and this seems to have been almost entirely due to the fact that the Presidents were conducting negotiations for the formation of a rigid traffic agreement, and that, being for the time more directly interested in rate making, they were more consistent in their repression of the natural rate-cutting propensities of their freight solicitors.

West of Chicago, aside from the Southwestern disturbance just mentioned, there was no *prominent* trouble until the autumn, when rates between Chicago and Colorado were so sharply reduced that even the Receivers of the Atchison, directly responsible to a United States court, issued tariffs showing through rates lower than those to intermediate points. The Receivers made an elaborate defense of these rates on being called to account by the Interstate Commerce Commission. What may be called the ordinary run of cut rates, west of Chicago, became in October so intensified that the executive officers of the roads met and expressed some good resolutions in vigorous language. In October there was a sharp passenger rate war between Ogden and Salt Lake City, and the people of Portland, Or., were surprised by the announcement that they could ride to San Francisco for less than half price. There is no competing railroad between these two cities, but the competition was with steamships of the Oregon Railway & Navigation Company. This war extended to freight as well as passengers, and although the passenger fares were restored two weeks ago, the reduced rates on freight are still in force. The report that they had been restored to the tariff basis seems to have been correct for a few hours, but the war basis was very soon re-established.

Some of the disturbances of the past year have recurred so many times or have been so difficult to settle that they have become chronic. The emigrant rate question as affected by the attitude of the Canadian Pacific is one of these. Our Chicago letter last week affords a picture of the situation about as it exists a good deal of the time; half a dozen problems on hand, but no one of them of such overshadowing importance as to elicit the energetic attention of enough high officers to settle it.

The facts touched upon in the foregoing paragraphs indicate one of the causes of a large aggregate reduction in the incomes of the railroads, and it might be asked whether a statement of earnings, showing how much less these were than they ought to be under normal conditions would not be a more appropriate way of setting forth the situation; but it is not so much the loss of earnings as the instability of prices that constitutes the most immediate problem for the Traffic Managers. The general shrinkage of business is a condition which railroad officers cannot help. As a whole, the railroads probably have not suffered worse losses than other industries—at least not very much worse—but the strife which produces fluctuations in rates, mostly secret and illegal fluctuations, does no permanent good to anyone, and only aggravates the inevitably disastrous conditions resulting from a falling off in business.

We have shown the losses in earnings in frequent notes of the monthly tables: in the present article we show some of the things that have prevented the distribution of these losses among all the roads equitably. With ideal conditions railroads would not engage in cut-throat war over ten thousand tons of freight any more than over a million; and as it is for the interest of the great majority of shippers (all except those whose business is so large that they can bulldoze the weak railroads) to secure the stability that would result from rational instead of irrational competition, why will they not take a more active interest in assisting the railroads to put into effect the only hopeful plan for steadying competition?

At the opening of 1895 a bill to repeal that section of the Interstate Commerce Law which forbids pooling of railroad traffic or earnings was pending in Congress, and there was some hope that it would be passed, but these hopes were soon found to be groundless, and the movement which has culminated in the formation of the Joint Traffic Association was begun soon after. The passenger and freight associations of the railroads of the southern states have been reorganized during the past year, but the freight department does not get along so smoothly as in former years. As the number of roads increases, and as the sharp methods of strenuous competition become more familiar to the traffic officers, these roads pursue the same tactics that are so familiar in the northern and central states. It was several months before enough roads agreed to support the new Southern States Freight Association to make it workable, and even then the selection of arbitrators hung fire, and now the Seaboard Air Line has threatened to withdraw from the Association.

The dullness of business during the past two years has led to very low rates in all directions. One of the most notable was the rate made by the railroads on corn from Buffalo to New York in April, less than two mills per ton per mile. The New York Central, the Erie, the Lehigh Valley and the Lackawanna all had a surplus of freight cars as well as idle locomotives and trainmen, and they (or some of them) took grain at rates below those offered by the canal boats. The exact price was not made public, but the assertions of the boatmen that the railroads accepted 2⅝ cents a bushel on wheat seem to have been substantially correct. It does not appear which of the roads took the most of this grain, and they were accused of carrying it at less than cost to destroy the business of the boatmen; but it is probable that the Central, at least, with its easy grades, powerful locomotives and 30-ton cars, could carry trainloads at the price named and make some profit.

Among the incidents of the year was the protracted drought in the valley of Ohio, throwing large quantities of coal and other traffic upon the railroads parallel to the river. The scarcity of Pennsylvania coal at New Orleans made business for the Alabama mines and their railroad outlets. The Atlanta Exposition has been the occasion of low passenger rates throughout a large territory in the South, lower than were ever made there before on anything like so extensive a scale. Another important passenger rate reduction of 1895 which, however, was not a novelty, was that made by practically all the through lines to the Knight Templar conclave at Boston. This reduction was availed of by travelers to New York as freely as by those going to Boston.

Canal boats have been run through between Cleveland and New York City the past season, and it is said that the results are encouraging to the promoters, but it is yet too early to see whether this enterprise is going to be a permanent competitor of the railroads.

Philosophers have long sought to discover a means of getting electrical energy from fuel without transforming it into heat and without the destruction of chemical reagents or the formation of waste products. The results of the discoveryof a process for doing this on a commercial scale would be so grand that the quest for it appeals to the imagination of the modern physicist almost as powerfully as the search for the philosopher's stone, which would convert any matter into gold, appealed to the alchemists of past ages. Many of the most acute and practical minds are at this moment giving a good deal of time to this search, and in the current number of *Cassier's Magazine* Dr. Louis Duncan attempts to answer in a very short article three questions: First, is it likely that the search for a method of directly producing electrical energy will be successful? Second, what will be the probable method? Third, what effect will it have on the industries of the world? His answers to these questions are briefly: That the problem, as he states it, will be solved; that the solution will be a simple one, but he is not permitted now to describe what he believes to be the one solution; and that it will destroy the boiler and engine industries, will seriously affect parts of the electrical industry, but will cause a development in the applications of electricity far-reaching and helpful to humanity in the end. The most familiar, as well as the least direct method of getting electricity now, is by first converting the energy of the fuel into steam. In this there are a number of transformations and excessive losses. Taking the average of all the steam plants of the world it is conjectured that about 95 per cent. of the energy of the coal used for power purposes is wasted. Another method of getting electrical energy, more direct but even less efficient than by transformation into steam, is by the thermo-electric battery. Some such batteries have had a limited industrial application, but their efficiency is so small and their depreciation so great that they have never been commercially successful. Lord Rayleigh has shown that the efficiency of such a battery could not be greater than three or four per cent. In this case the fuel energy is first transformed into heat, then into electrical energy; and as it is apparently impossible to make this transformation without a very heavy loss it is of the first importance to skip this step. There are other heat methods, some of which have been tried on a comparatively large scale, but none give any promise of success. The conditions of the problem are stated thus: Electricity must be produced, and nothing but fuel and air must be consumed. Either a gas battery must be used or some substance must be discovered which will convey the oxygen of the air to the carbon without being itself decomposed. The conclusion of a brief review of the history of the gas battery is that it is apparently ruled out by fundamental physical defects. Dr. Duncan knows of no method of using solid fuel that has yet been publicly described that gives any promise of success, but he has seen a method, not patented yet, which does fulfill the conditions, and surely the scientific world awaits with keen interest the development of this method.

Half a dozen years or so ago some of the officers of the Pennsylvania, who had been employed on one division during construction or immediately thereafter, formed an association, to include officers who had been on the division in its early days, and arranged for occasional meetings. That, so far as we can recollect, is the only organization of a similar nature which has been formed among railroad men. It seems strange that there are not more such organizations, for railroad men, everywhere, show about as keen an interest in the subsequent careers of their former associates as college men do. Probably, as the railroad service settles into a profession, and the average length of service increases, such associations may be more often formed. At any rate, the recent publication of lists, such as that of former Wabash officers, given in another column, shows the interest that exists. A reader sends us a clipping from the Pittsburgh *Post* which gives a list of former Pennsylvania officers mostly in the civil engineering department, obviously quite incomplete, and limited to those who have left the Pennsylvania service, within a few years past.

C. H. Middleton, formerly Assistant Engineer, Pittsburgh office, now Assistant Chief Engineer Denver & Rio Grande; S. B. Fisher, formerly Superintendent Monongahela division, now Assistant Chief Engineer Missouri, Kansas & Texas; H. J. Slifer, formerly Assistant Engineer, Philadelphia office, now Division Engineer Chicago & Northwestern; A. T. Dice, formerly Supervisor, Millersburg, Pa., now Superintendent Atlantic City road (P. & R.); L. Blackstone, formerly Supervisor, Jersey City, now Assistant Engineer Philadelphia & Reading; H. M. Sperry, formerly Supervisor Signals, Jersey City, with National Switch & Signal Co.; Wm. A. Johnston, formerly Supervisor, Philadelphia, now Manager Barberton Land Co. and Engineer Barberton Belt line; Wm. M. Kinch, Supervisor Signals, Pittsburgh, now Superintendent of Signals, N. Y. C. & H. R.; H. Bartlett, formerly Assistant Road Foreman Engines, Harrisburg, now Superintendent Motive Power, Boston & Maine; T. J. Brereton, formerly Supervisor Tyrone division, now Engineer Cumberland Valley; A. Bruner, formerly Engineer Pittsburgh, Ft. Wayne & Chicago, now Assistant Engineer Norfolk & Western; H. W. Edwards, formerly Assistant Supervisor, Philadelphia, now Engineer Maintenance of Way, Great Northern.

The Board of Managers of the Joint Traffic Association met in New York City, Jan. 3, discussed various questions concerning the organization of the association and

adjourned to Jan. 6, when the question of rates on freight coming from Europe was taken up, but not settled. Mr. F. H. Hoyt was elected Secretary, and, as stated by Commissioner Blanchard—

"The present Freight and Passenger Committees of Trunk Line and Central Traffic Associations were requested to present their recommendations from time to time to the managers for consideration, action and confirmation; the question of cartages and drayages was considered and laid over for future action; a hearing was appointed for Jan. 8 for the consideration of import rates; the action of the New York State Committee as to rates to and from Niagara frontier was unanimously approved; consideration was given to the method of filing tariffs."

The Chicago correspondents have already found a case for the Board to exercise its wisdom upon. They say that the Wabash and Michigan Central are allowing grain shippers from $2 to $3 a car for transfer of grain at Chicago and Joliet elevators under contracts with the elevator companies which cannot be broken. This, of course, need not make any trouble if the machinery of the Association shall be run in the same spirit in which it was built, and there is no reason to doubt that it will be. If we may judge by what some of the traveling freight and passenger agents tell the reporters, there is in the offices of the soliciting agents a frigid air that can only be compared to the outdoor temperature registered by the thermometers on Sunday and Monday last. Irregular practices have not been so severely frowned upon since 1887, when every one was overawed by the newly enacted Interstate Commerce law. Up to the time of going to press no action had been taken in the court at New York by the District-Attorney concerning the alleged illegality of the Association agreement.

It appears that 22 persons have been killed at grade crossings in Rahway, N. J., within less than four years, and the Newark *Call* says: "The railroad company runs its trains through Rahway at a terrific rate, and, gate or no gate, carelessness or not, the crossing of streets at grade with such conditions is a crime, and the 22 killings are murder as much as if the fatal blows were deliberate. What does the legislature propose to do with this and many similar cases throughout New Jersey." The New York *Tribune*, passing over the question, calls attention to the fact that the Pennsylvania Railroad has voluntarily abolished many grade crossings in New Jersey. "The track elevations in Jersey City and Elizabeth bear testimony to that, and to these could be added the elevation of the tracks in Newark if the Central Railroad did not block the way." We quote this item, not for the purpose of favoring the world with a "solution" of the crossing problem—each problem must be settled by itself, according to the degree of certainty with which the future earning power of the railroad, or ability of citizens to pay taxes, can be calculated and the cost of the improvement adjusted to it—but to emphasize the fact that people walk on and across tracks in spite of gates. Rahway is a level place and the conditions are somewhat like those in large Western towns, though the Pennsylvania runs more fast trains than any road in the West, probably. The talk about murder is wild, for it is likely that these 22 cases were more purely accidental than the average of track fatalities; but the critic might well have said that under present conditions it will be as hard to reduce the death record as it would be to prevent suicides by lunatics or murders by drunken men. As long as tracks are easily accessible, Americans will make free use of them—unless they change their nature.

No other people on earth are showing such enterprise and boldness in building new railroads as the Russians. Where they get the money to build their great lines across rude and thinly-peopled countries, and even across countries which are uninhabited, is a mystery, but they are building them. One of the works now under way is a railroad 400 miles long from Vologda to Archangel. Vologda is a little to the north of the middle of European Russia. It is about 10 degrees of longitude east of St Petersburg and about one degree of latitude south. Archangel is a port at the head of a gulf of that name on the White Sea. This railroad was authorized by a decree issued July 10, 1894. The rails are now laid on 12 miles of it. The work now under way is from Archangel south and 7,000 workmen are employed there. For 20 miles the line is through an uninhabited wilderness, and for 160 miles south from Archangel there is but one village of 15 little houses on the line. Much of the way there are forests through which cuttings must be made before horsemen can pass. At one place in the province of Archangel the railroad will be carried for 16 miles on a pile trestle. At Archangel elevators and docks will be built and establishments for freezing fish, and it is expected that the entrance to the port will be deepened to 22 ft. before the railroad is built through. In 1895, 24,000 tons of freight were shipped by sea from Archangel, and 1,005 vessels of greater or less size entered there. It is proposed to establish along the line of this railroad stations which shall be not only railroad stations, but trading posts.

NEW PUBLICATIONS.

The Iron Age of Jan. 2, is an anniversary number, that journal having been established in 1855. This issue contains 128 pages, with three folding plates of diagrams. A special feature is a series of papers by experts on various subjects, closely connected with the production and manufacture of metals. For instance, Mr. James Douglas writes on the Copper Industry; Mr. John Stanton, on Copper Mining at Lake Superior; Mr. E. A. Caswell, on the Lead Industry; Mr. Wm. Garrett, on the Development of Wire Rod Railing; Mr. John Birkinbine, on Forty Years of Progress in the Pig-Iron Industry; Mr. O. W. Potter, on Early Iron Working in Chicago; Mr. Oliver Williams, on the Iron Industry of the Lehigh Valley; Mr. William Metcalf, on Pittsburgh as an Iron Center; Capt. R W. Hunt, on Steel Rails in the United States; Mr. F. A. Pratt, on Early Machine Building; Mr. F. B. Richards, on the Lake Iron Trade; Mr. Andrew Carnegie, on the American Iron Trade. Another special feature is the reproduction of a few articles from early issues of the *Iron Age*.

For example, in 1865, that journal had discovered from reliable sources, that the Eastern steel manufacturers (east of the Alleghenies), "have a capacity for producing steel at the present moment to the extent of 35 tons per day. Those west of the mountains, mainly around Pittsburgh, are able to produce about 75 tons a day, or an aggregate of 66,000,000 lbs. per year." It will be observed that the discreet editor put the total in pounds rather than tons, to make a proper impression on the minds of his readers. The actual supply of American steel was about two-fifths of the demand. This prodigious output it will be observed had been arrived at 30 years ago.

Another reprint from Nov. 11, 1869, is on Steel Rails in 1869, and it is a grave and earnest argument for the use of steel rails on our railroads. That venerable attempt at technical journalism, which in 1869 was almost the only publication in the country that could pretend to be a scientific magazine, *Van Nostrand's Magazine*, is quoted as saying, that "it is estimated that from 40,000 to 50,000 tons of steel rails are in use on our railways," but the *Iron Age* had made "careful researches during the past week" and is able to present much more encouraging figures, and boldly asserts that by the end of the year 1869 "there will be laid 110,000 tons of steel rails, equal to 1,100 miles of steel road. These rails are in use on more than 50 roads, and are partly of American, principally of English and to a very small extent of Prussian manufacture."

Four large steel works at that date had been established in this country for making rails. John A. Griswold & Co. were established at Troy and had made about 2,000 tons of rails and could show certificates that none of these rails had broken. The Pennsylvania Steel Works at Harrisburg were producing steel rails "at the rate of" 12,000 tons annually, with a yearly capacity of 20,000 tons. The Cleveland Rolling Mill Co. was producing steel rails at the rate of 6,000 to 8,000 tons a year, with a capacity of from 15,000 to 20,000 tons annually. They were making steel rails from Lake Superior iron. The Freedom Iron & Steel Works at Lewiston were also making steel rails at the rate of 8,000 tons a year, with an annual capacity of 10,000 to 12,000. The works of the Cambria Iron Works, Johnstown, were nearly finished. Four great English companies were competing actively in the American market. These were Guest & Co., of Dowlais; The Barrow Hamatite Steel Co., The Cammell Works, and, finally, John Brown & Co., who had furnished to the United States at that date 51,000 tons of steel rails, or more than all of the other steel works put together.

All of these English works were furnishing good rails, and the discreet editor of 1869 observed that "none of them has any marked superiority over the others"; showing that he had already developed that sense of justice and fairness which has made his journal the trusted repository of information, and a valuable spokesman for great business interests.

At that time the price of rails at the English mills was about £12 in gold, the duty was 45 per cent. and this, with transportation, brought the price in America up to £19 gold, or $130 currency. Iron rails were then selling for $85; poor ones for considerably less, and the editor is shocked and grieved to find that many railroads would not even use good iron rails, much less buy steel. One dealer says: "It is the hardest thing in the world to sell a good rail, but if we had 25,000 tons of miserable bars, we could sell them in a week. Plenty of Southern and Western railroads are sending on here for 50 and 52-lb. rails, when their tracks ought to be laid at least with 60-lb. rails." The editor adds, "such talk is culpable, but perhaps natural." This sounds very much like the talk we hear to-day, especially with regard to car wheels.

Another interesting reprint is on the steel trade of Pittsburgh in 1869. Another is on the mines and manufactures of Pennsylvania in 1866, one of a series of articles published in that year.

Besides these reminiscences this anniversary number contains valuable statistics brought up to date. For instance, one such article is on the American iron trade since 1870. This is a monograph of seven pages. A chart showing fluctuations in prices of rails, billets and pig iron, and showing the production of rails for 25 years, we shall take the liberty of reproducing in our own pages. Another chart gives particulars of a great many articles of hardware for 75 years, and a very striking engraving shows graphically the production of coal, pig iron, lead and spelter in the United States as compared with many great buildings. For instance, the column of coal, 1,000 ft. in diameter, reaches almost to the top of Mt. Washington, and the column of pig iron, 100 ft. in diameter, is even higher. The great pyramid, Cologne cathedral and the Eiffel tower are trivialities standing at the base of this enormous coal column, and the picture is wonderfully impressive.

Cassier's Magazine for January is a special electrical number. It is physically a beautiful volume, and contains an important list of contents by writers of prominence in their specialties. A few of the articles which we should suppose would be of most interest to our readers are Gas Engines for Electric Light and Power, by Mr. Nelson W. Perry; When it is Advantageous to Use Water Power and Electric Transmission, by Dr. Emery; the Direct Production of Electrical Energy, by Dr. Louis Duncan, and Electrically Operated Factories, by Mr. R. E. B. Crompton. A very short article by Mr. Hiram S. Maxim on Electricity for High Speed Railroad Trains is disappointing, and in some particulars it is misleading. Nobody questions that, physically, it will be possible to run trains by electric motors much faster than they can ever be run by steam, but what we had hoped to learn from Mr. Maxim is something of the probable cost of very high speeds and something of the possibility of remuneration. The article is merely perfunctory and contributes nothing to the discussion.

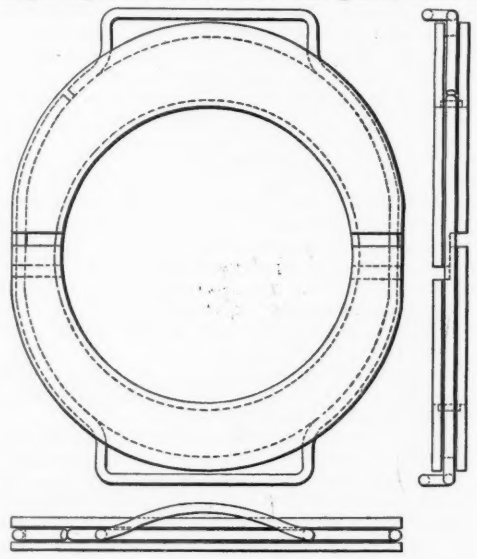
The *Engineering Magazine* for January has an interesting table of contents. Mr. Thomas A. Rickard writes on the Cripple Creek Gold Mines and the Stock Boom; Mr. Swank makes a forecast of The Future of the American Iron Trade. Mr. H. T. Newcomb has an article, Are American Railway Rates Too High? This we have quoted at some length on another page. Mr. Henry Floy attempts to answer the question, Are We Educating Too Many Electricians? giving the practical experience of 119 recent graduates. Prof. J. B. Johnson has a paper on The Location and Construction of Dams, which is an excellent general review of his subject, illustrated by many examples. A paper on A Piece-Rate System and Shop Management is an abstract of Mr. F. W. Taylor's very thorough and important paper, presented at the Detroit meeting of the American Society of Mechanical Engineers last June, and reprinted at considerable length in the *Railroad Gazette* at the time.

The Plant System has issued a "Compendium of Reliable Facts" concerning those portions of South Carolina, Georgia, Alabama and Florida traversed by the Plant railroad lines, and the pamphlet will be sent free to any one by B. W. Wrenn, Savannah, Ga. It has been prepared by Judge Joseph Tillman, of Quitman, Ga., and is designed to convey information to home seekers. It consists of 130 pages, chiefly devoted to commercial and manufacturing statistics of the cities and practical chapters on the quality of the lands and the conditions of farming and fruit raising in the country districts. The whole of the work seems to have been written and edited with care, and is pretty well up to date.

Leisure Hours in Florida is the title of another pamphlet, of 50 pages, that has been issued by the Plant System. This, as its title indicates, caters to people who travel for pleasure rather than to those who go on business. Like the one noted above, it is an original composition, being written by "Bill Arp" (Charles H. Smith), the well-known humorous writer, and every chapter is entertaining. Mr. Smith has lived in the all his South life, and the local history of the last 40 years is at his tongue's end; and the moral and other reflections interspersed among the facts are of just the right tone to suit the sleepy atmosphere of a seaside loafing resort. The book contains numerous attractive half-tone illustrations from photographs. It tells chiefly of Suwanee Springs, Gainesville, Tampa, Punta Gorda, Fort Myers and other places on the west coast. Copies will be sent free by B. W. Wrenn, Passenger Traffic Manager, Savannah.

The New Drexel Dust Guard.

The Drexel Manufacturing Company, of Chicago, Ill., are putting in the market a new dust guard, which is



The New Drexel Dust Guard.

shown in the accompanying illustrations. It consists of two pieces of wood fitting together and forming an oval-shaped collar about the axle. These two pieces are held

together by a piece of spring wire fitting in an encircling groove. They overlap enough at the joints to permit them to be closed up by the spring. By this construction the pieces fit closely about the axle at all times, preventing the admission of dust between the axle and guard. The same spring is bowed out at the top and bottom so as to come in contact with the rear wall of the slot in journal box and thus holds the guard firmly against the front wall of the slot, making a practically dust-tight joint. To prevent excessive wear that would occur on the wood, a strip of flexible vulcanized fiber is inserted in a groove next to the axle.

TECHNICAL.

Manufacturing and Business.

The Union Boiler Works Company, of Lebanon, Pa., was reorganized to-day, with a paid-up capital of $15.000. These officers were chosen: President, Ephraim M. Boltz; Treasurer, John Hunsicker; Superintendent, Henry T. Richards; Foreman, William Schools; Solicitors, Thomas H. Capp and George B. Schock. The concern will hereafter be known as the Union Boiler and Manufacturing Co.

The Rogers Iron Works, of Oakland, Me., has recently been incorporated, with a capital of $300,000, to manufacture a complete line of tools for machine shop equipment, pulp mill machinery, etc., having special facilities for handling heavy and light foundry work, etc.

The Columbia Car Coupler Co., of Atchison, Kan., has been incorporated in Kansas with a capital stock of $150,000. The Trustees are: L. T. Backus, C. W. Weller, R. R. Herd and R. A. Park.

The Philadelphia offices of the Carnegie Steel Company, Limited, and H. C. Frick Coke Company are now located in the Harrison Building, southwest corner Fifteenth and Market streets, Philadelphia.

The Berlin Iron Bridge Co., of East Berlin, Conn., has just completed for the Windsor Co., of North Adams, Mass., a new fire-proof store house, 70 ft. wide and 125 ft. long. The construction is composite, being iron and brick, the whole being fire-proof, no wood work being used. The floors are made of terra cotta.

The National Tube Works Company resumed operations in full on Jan 6, after an idleness of nearly a month. The resumption gives employment to nearly 3,000 men. The National Rolling Mill started at the same time, giving work to about 2,000 men.

E. H. Wilson & Co., 222 South Third street, Philadelphia, offer for sale the machinery of the Lamokin Car Works in the shops at Lamokin, Chester, Pa. This machinery includes a large variety of wood-working machines and machinists' tools made by Greenley Brothers, The Berlin Machine Co., Hilles & Jones and other well-known makers, and a miscellaneous equipment. Among the wood-working machines are upright and horizontal mortisers, boring machines, tenoners, a number of styles of saws, lathes, etc. There are three boilers with fittings complete, a Buffalo blower, six tuyere irons for forges and one for a heating furnace. The tools may be seen by applying to Wilson & Co.

Pratt & Letchworth, of Buffalo, have closed their malleable iron foundry, throwing about 600 workmen out of employment.

The Buckeye Malleable Iron & Coupler Co. is very busy and contemplates making an addition to its works at Columbus. Among recent orders was one for the equipment of the 500 cars ordered by the Toledo, St. Louis & Kansas City road from the St. Charles car works.

The duplex compound air compressor, built by the Rand Drill Co. for the Master Mechanics' Convention at Alexandria Bay last year, and exhibited at the Cotton States Exposition at Atlanta, for running compressed air tools, has been sold to the Wolff Packing Co., Topeka, Kan.

Bryan & McKibbin, of 120 Broadway, New York, who became General Agents of the Cooke Locomotive & Machine Co., some time ago, have now been appointed General Sales Agents.

The officers of the Q & C Company are again in control of the company's business, the long legal complications having been ended this week by the discharge of the Receiver, Mr. C. F. Quincy, who is also the company's Treasurer. All claims against the company were paid in full, with six per cent. interest. Now that the business management is again in the control of the company the outlook for doing a large trade seems very promising.

The Great Northern is equipping 500 cars with the rabbeted grain door made by the Chicago Grain Door Co.

Mr. L. R. Pomeroy has been appointed Sales Agent for the Cambria Iron Co. and the Latrobe Steel Co., office 33 Wall street, New York. Mr. Pomeroy's business record is so well known to our readers that we need say no more than to make this announcement.

The Thomas Aldcorn Company, Limited, of New York City, has been organized to manufacture machinery The directors are: Thomas Aldcorn, New Durham, N. J.; Winthrop Pond, Portchester, and George W. Ballou, of New York City. Mr. Aldcorn was formerly Division Master Mechanic of the West Shore.

Iron and Steel.

The Illinois Steel Company, Dec. 31, closed for a month its Bessemer and nail mills at South Chicago. This was done to make repairs.

The contract for the iron and steel work on the Appraiser's stores in New York City has been awarded to Post & McCord, of that city, at $339,550.

The real estate, plant, personal property, rights and franchises of the Lickdale Iron Company, Ltd., at Lickdale, Pa., was sold on Jan. 2, under an order of the Court of Common Pleas of this county, to Dr. Sampel Weiss, of Lebanon, for $230, subject to a mortgage for $100,000.

The Carnegie Steel Company, Limited, held their annual meeting at Pittsburgh on Dec. 31. The following Board of Managers was elected: H. C. Frick, John G. A. Leishman, W. H. Singer, J. H. Curry, F. T. F. Lovejoy, L. C. Phipps, John Pentefract, Charles M. Schwab and Alexander B. Peacock. The Board was organized by the election of H. C. Frick as Chairman, after which John G. A. Leishman was elected President; L. C. Phipps, Vice-President and Treasurer; F. T. F. Lovejoy, Secretary.

The Ross-Meehan Brake Shoe Foundry Company, of Chattanooga, Tenn., on June 4, purchased the extensive plant of the Southern Malleable Iron Company for $45,000. The sale was made under a decree of the United States Court. The plant, which originally cost $84,000, went into the hands of receivers in November, 1893, will be reorganized and operated by the purchasers.

Press reports say that an understanding has been reached between the principal producers of Lake Superior Bessemer ore by which the standard price of Marquette and Gogebic Bessemer will be $4 a ton this year, with a differential against Mesaba Bessemer, and one in favor of the gilt-edged Bessemer of the Lake Angelina and several other properties. A tonnage assignment has also been partially decided on. This price is an advance of $1.10 over last year's figures. Non-Bessemer ores are not included in the agreement.

Interlocking.

The National Switch & Signal Co., of Easton, Pa., has received an order for two large interlocking plants to be erected at Stockton, Cal., at the crossing of the Southern Pacific with the new San Francisco & San Joaquin Valley Railroad. The National Company is also doing some work for the Southern Pacific at Los Angeles.

Large Order for Woodiline.

The Pennsylvania Railroad has just ordered from the American Wood Preserving Co., of Philadelphia, Pa., 5,000 gals. of their woodiline, to be used in treating ties and bridge timbers on that road. A tank used for the application of the preservative has been completed recently at Pavonia, N. J., and it is here that the timber will be treated. The Pennsylvania has been experimenting with Woodiline for some time, and the gradual extension of its use by the company would indicate a firm belief in its value as a wood preservative.

New York Harbor Defenses.

Two 10-in. disappearing guns for Willet's Point, L. I., arrived there on a lighter from Sandy Hook on Jan. 7. A force of workingmen is now at work mounting the guns.

A Record of Steam Motor Endurance.

The Gas Company, of Paris, France, has in its shops at Tory a 5-H. P. de Laval steam turbine which holds a high record for endurance. It operates an extractor 21 hours a day, and has now run for 5,300 hours. After 1,700 hours it was stopped for a brake test. Since then it has been running 3,600 hours continually. The peripheral speed of the disk being 525 ft. per second, 1,900,000 miles in all, or about 78 times the circumference of the globe, have been made since it started, and about 53 times the circumference in 150 days since it has been running without interruption. The result is the more remarkable as the machine is running without attendance. Some one has to fill up an automatic oil-feed every 12 hours; that is all the attention it has needed; 120 lbs. of oil have been consumed each month.

Compressed Gas.

The government report of mail car accidents for the year ending June 30, 1895, records 33 cases in which mail was damaged by oil and three cases in which the subsequent destruction by fire was caused by oil lamps. The use of compressed gas and Pintsch lamps is recommended. The great improvement made in these lamps and the establishment of compressing plants at so many of the principal cities leaves no reasonable excuse for not using gas and taking away this one element of danger to mail clerks and mails. The same is true of passengers and passenger cars, in quantity of light, cleanliness and safety.

Car Doors and Attachments.

The Committee on Freight-car Doors and Attachments request members of the Master Car Builders' Association to reply as promptly as possible to the questions given below:

(1.) Give your experience and the result obtained from the use of the different freight-car doors in use on your road. (2.) What style of door do you prefer—the overhead hung, the bottom hung, or other style hung door, and why? (3.) What style of door or doors are standard on your line, and what are their advantges over other doors? Blue prints are asked showing doors, including end doors and attachments, covering the following detail: (A.) Size of doors and style of construction. (B.) Style of hangers used. (C.) Style and shape of rail and size of same. (D.) Method of securing rail to body of car. (E.) Locks and their attachments and method of application. (F.) Stops, both front and back. (G.) Brackets at bottom of door, including common brackets and special safety brackets, to prevent opening of door without breaking of seal. (H.) Wedges, shoes, etc., used on bottom of door. (I.) Description of any peculiar construction of bottom of door where it runs into brackets or on rail. (J.) Description and name of any patent device in use in connection with door hangings or fastenings, not brought out by preceding questions.

Replies should be sent to F. H. Soule, General Car Inspector, N. Y., N. H. & H. R.R., New Haven, Conn., before Feb. 20.

Notes of the Navy.

The contracts for the new bettle-ships Kearsarge and Kentucky were, on Jan. 4, delivered to the Secretary of the Navy, and work on the ships has already been commenced by the Newport News Company.

Work was begun on Jan. 7, at John H. Dialogue & Sons' shipyard, on the Delaware River, on the new United States torpedo boat known as "No. 13."

The President, on Jan. 4, signed the resolution authorizing the acceptance of the ram Katahdin, constructed by the Bath Iron Works, of Bath, Me., and rejected by the President and Secretary of the Navy for failure to make the speed required by the contract.

A contract for projectiles has been made with the Sterling and the Carpenter companies, the amount allotted for the purpose being equally divided between the two concerns, each receiving $250,000. The contracts were not awarded through competitive bidding, but through an offer made by the Navy Department for projectile companies, at rates, which the two firms accepted. The contracts call for 13-in. and 8-in. armor-piercing shells for the battle-ships Kearsarge and Kentucky, 8-in. shells for the armored cruiser Brooklyn, and 12-in. shells for the coast-defense vessel Puritan.

A New Machine Gun.

A new automatic machine gun has been tested by the Government which the Small Arms Board reports to be the most destructive weapon, firing a bullet of its caliber, yet found. The caliber is the same as that of the small arm used by the army. The gun has a record of 420 shots a minute, and requires no work, except the pressure of an electric button, to maintain the fire. The Gatling gun, now used in the navy, has a weight of 350 lbs., while the new gun weighs only 35 lbs., and can be carried by a man on his shoulder. The new gun is made by the Colt's Arms Co.

A Bridge Works Burned.

Fire broke out on Jan. 4 in the large plant of the American Bridge Works, West Fortieth street and Stewart avenue, Chicago. The firemen found great difficulty in extinguishing the flames owing to the intense cold. The works were partially destroyed, the loss being estimated at $75,000, fully covered by insurance.

Mannocitin.

Otto Goetze, 15 Whitehall street, New York City, is introducing into America "Mannocitin," a rust preventive, and "M. and M." rust proof paints for iron work, structures, bridges, etc., as manufactured by Edmund Muller & Mann, of Berlin, Germany. The former is a composition of grease and oils, the oils evaporating in a few hours and leaving a thin, slightly soft film, which adheres to metal and forms a protection against the air, impure and salt waters, gasses, smoke and fumes of acids. The preparation contains no acid and preserves the original polish of the metal. This is used in place of white lead, tallow and other rust preventives for coating the bright parts of locomotives, carwheels and axles, switches and machinery. "Mannocitin" has been adopted as a rust preventive by the German and other foreign government railroads, and many large German manufacturers, including the Phœnix Iron and Steel Works and Julius Pintsch. The "M. and M" rust proof paints are used by the Northeastern Railroad of Switzerland and several German Government railroad repair shops, and by many large foreign manufacturing plants.

Chicago Main Drainage Canal.

The most important matter that came up before the Board of Trustees at their meeting on Jan. 3 was letting the contract for the "Bear Trap dam" and controlling works at Lockport. The Joint Committee on Finance and Engineering reported in favor of awarding the contract to Christie & Lowe, and, after considerable opposition on the part of some members, who were apparently actuated by political reasons, the contract was awarded to these contractors.

A resolution was offered by one of the board to require members of the Engineering Department to be residents of the Sanitary District. The object of this resolution is to remove Chief Engineer Isham Randolph, against whom has arisen considerable opposition in the board. The resolution was referred to the usual committee.

The Naval Engineers.

The effort to increase the size and efficiency and raise the status of the engineer officers of the United States Navy appears again this year in two bills that have been introduced in Congress. One of these, Mr. Squire's bill, makes the active list consist of 18 captains, 25 commanders, 60 lieutenant commanders, 70 lieutenants, 65 junior lieutenants and 65 ensigns besides cadet engineers. This bureau is to be presided over by a Director General of Naval Engineering with the rank of rear admiral, assisted by two Inspector-Generals with the rank of Commodore. The Meyer bill provides for one Engineer-in-Chief as head of the bureau with the rank of post captain; 10 engineer directors with the rank of captain, 15

fleet engineers with that of commander, 35 staff engineers with that of lieutenant commander, 50 engineers with the rank of lieutenant, 40 junior engineers with the rank of junior lieutenant, and 40 assistant engineers with the rank of ensign. Mr. Squire's bureau will have charge of all machinery used on vessels excepting gun carriages, torpedo tubes and their fittings. Under the bill the ranking engineer officer on board a ship has direct command of the engineer staff under the line officer in command of the vessel. The bill provides also for the appointment to the engineer corps of graduates of technical schools other than the Naval Academy.

Carbolineum.

The Q. & C. Co. has undertaken the sale of the wood preserving compound known as Carbolineum. This is an article which has been used for several years by railroads and street railroads, as well as by other parties. The Q. & C. Co. has as a consequence of its long experience in introducing the Servis tie plate, become convinced of the importance of a good wood preservative, and has investigated carefully various preparations and processes and finally has decided to undertake the sale of Carbolineum, which is adapted not only for use for ties and bridge timbers, but for car timbers and for timber and lumber generally which can be profitably treated for preservation. It is averred, furthermore, that Carbolineum is a preventive of the ravages of the teredo, but of this latter claim engineers will certainly want considerable detailed evidence.

Water-Tube Boilers in the Navy.

The Board of Naval Bureau Chiefs has decided to furnish gunboat No. 10, to be built by Lewis Nixon, at Elizabeth, N. J., with water-tube boilers. This will be the first vessel of our navy to be completely supplied with such boilers, although the Monterey has one-half her boilers of this type.

The Chicago will also be supplied with them for one-half of her battery. The other half will be Scotch boilers.

THE SCRAP HEAP.

Notes.

There was a small strike in the repair shops of the Western New York & Pennsylvania at Buffalo, Jan. 2.

George W. Davis, who was convicted of the crime of derailing a passenger train near Lincoln, Neb., in August, 1894, has been sentenced to imprisonment for life.

The South Carolina Constitutional Convention has adopted a section forbidding railroads to make freight rates conditioned upon the giving of a release by the shipper.

Officers and employees of the Wabash Railroad receiving more than $100 a month suffered a reduction of 10 per cent. in their pay in September, 1893; they have just had the 10 per cent. restored.

The general office building of the Norfolk & Western at Roanoke, Va., was destroyed by fire Jan. 4. Loss, $70,000. About 300 men were employed in the building. The records of the car accountant's and the claim agent's offices were mostly burned up.

Senator Brice, of Ohio, has introduced in the Senate a bill directing the International Deep Waterways Commission to make additional inquiries as to the feasibility of constructing a deep-water channel between the great lakes and the Atlantic Ocean, with or without the co-operation of Great Britain or Canada.

The Pennsylvania Railroad has fitted up a 60-ft. car with apparatus for the purpose of instructing trainmen in the care of steam-heating apparatus. The "return system," used on the Pennsylvania cars, and the New York Safety, which is in use on some of the Pullman cars, are both illustrated by the apparatus in the car.

The regulation of the speed of electric street cars in Brooklyn, N. Y., seems to be a difficult task. A number of inspectors were appointed some time ago to watch the cars in various parts of the city, and one of these lately reported to the Mayor 89 violations of the city ordinance in one week. Many of the speeds reported by him were from 16 to 20 miles an hour.

It is reported in Denver that the "Rocky Mountain Postal Telegraph Company" has been organized at Helena, Mont., to build a telegraph line from Denver to Salt Lake and Ogden, from Denver to Ogden via Cheyenne, and from Helena to the Pacific Coast. The Postal Telegraph Company already has some lines in the state of Washington which have no connection with its eastern lines.

The suit of the United States Pipe Line Company, a rival of the Standard Oil Company, to secure the right to lay a pipe under the track of the Delaware, Lackawanna & Western Railroad at Washington, N. J., has failed. The attempt to lay the pipe some weeks ago was forcibly resisted by the railroad company, and an injunction forbidding the use of such force was asked for, but Vice-Chancellor Bird has refused the application.

On the Cincinnati, New Orleans & Texas Pacific the section foreman who receives a premium has placed upon his tool house a placard announcing the fact. The awards for 1895 have just been announced, the highest, for supervisors, being given to Mr. M. Rohan. On this road a good deal of work is done by floating gangs and work trains, so that the prizes, which are awarded strictly for efficiency as indicated by the expenditure for labor, materials, etc., do not always go to the sections which have the best track.

The Brooklyn Heights (Street) Railroad of Brooklyn, N. Y., has failed to secure an injunction to restrain the city of Brooklyn from limiting the speed of electric cars to 6 and 8 miles an hour. The decision, by Justice Cullen, of the Supreme Court, denying the application, admits that in some streets the limit fixed by the city may be subject to criticism, but the precise rate of speed is a matter within the discretion, not of the courts, but of the Common Council of the city. The plaintiff must apply to the Common Council for a modification of the ordinance.

Locomotive Building at the Baldwin Works.

During the year 1895 the Baldwin Locomotive Works built 401 locomotives. The output is about 28 per cent. in excess of that of the previous year, 1894, when but 313 locomotives were built, and about 52 per cent. of the product of 1893, when 763 locomotives were sent out by the firm. Of the 401 locomotives constructed during the past year, 162 were for export. There are now in hand orders for 90 engines. Of this number 20 constitute the balance of the order placed some months ago by the Russian Government. These 20 engines are rapidly approaching completion, and will be ready for shipment by the latter end of January.—*Philadelphia Record.*

Fast Time in the Rocky Mountains.

The Denver *Republican's* special train, carrying its New Year's edition over the Santa Fe, Colorado Midland and Midland Terminal lines, from Denver to Cripple Creek on Jan. 1, made the run from Denver to Colorado Springs over the Atchison, Topeka & Santa Fe—75 miles—in one hour and 27 minutes; Colorado Springs to Pueblo, 45 miles, in 48 minutes; Colorado Springs to Divide, up a very steep mountain grade, 29 miles in 55 minutes; Divide to Cripple Creek, 29 miles, mountain road; one hour and three minutes, making the run from Denver to Cripple Creek, 133 miles, in three hours and 20 minutes, including 28 minutes' unavoidable delay.

A rival train chartered by another paper, on the Denver & Rio Grande, ran off the track at Malta, and the engineer and fireman were killed.

The Canals of New York.

The annual report of the Superintendent of Public Works, State of New York, says: "The whole number of tons carried upon the canals of this State during the season of 1895 was 3,500,314 tons, of which 2,327,481 tons was in transit toward tidewater and 1,172,835 tons was moved westward. Of these amounts 1,762,663 tons were through freight and 1,797,651 tons were way freight. The amounts carried by the several canals were as follaws: Erie Canal, 2,356,084 tons; Champlain Canal, 966,335 tons; Oswego Canal, 64,691 tons; Black River Canal, 64,154 tons; Cayuga and Seneca Canal, 49,050 tons; total, 3,500,314 tons."

Premiums for Time Made Up.

The French Ministry of Public Works has recently addressed to the various French railroads a circular letter with regard to some of the complications arising from the fact that enginemen are paid premiums for time made up. It is believed that certain dangers follow the custom of giving such premiums, because the enginemen are tempted to run too fast when they have lost time. These dangers are modified, it is true, by the premiums for fuel saving, and by the rules fixing the maximum speeds. It is thought important to avoid excessive speeds, and yet it is no less important to avoid delays, which disarrange the traffic and cause complaints from the public, and which are often the cause of accidents. The railroad companies are requested to make a study and report concerning the systems of premiums, both for time gained and for fuel saved, in their relative effects, and also to consider and report upon the practicability of a general use of registering speed records.

Railroad Equipment for Export.

We noted recently a large shipment of cars, locomotives and other railroad equipment made by the New York Equipment Co., to the Island of Jamaica, for James P. McDonald & Co., contractors, who are building an extension of the Jamaica Railroad. That has been followed by another large shipment of railroad material, including about 1,000 tons of bridge girders, which will also be used in the heavy work on the Port Antonio extension of the Jamaica road. The cargo being too large to be carried in one shipment by the regular steamships running to the West Indies, the New York Equipment Co. chartered a special steamer to carry the material.

Flood4 on the Trans-Caspian Railroad.

Rainstorms in the region of the Trans-Caspian Railroad have done great damage. Official reports received at St. Petersburg on Dec. 18 state that more than 50,000 cubic yards of roadbed have been swept away; the flood carried away tracks, ties and all, over a stretch of more than 12 miles; seven small and five long bridges have disappeared altogether, and two station buildings have been entirely demolished. The total damage is estimated at more than $1,200,000.

The Reported Iron Mine Combination.

It is asserted that a great trust or monopoly is being formed in the product of Lake Superior mines. John D. Rockefeller is said to be the leader and to have invested $7,000,000 in ore lands, vessels and railroads in the Lake Superior region. But in 1892, George H. Ely, of Cleveland, a very competent authority, estimated the total capital employed in mining and distributing iron ore in the Lake Superior district at $175,394,985, and costly additions have been made since, so that Mr. Rockefeller's investment bears but a small proportion to the sum of the interests involved. The cost of mining is a small item in the value of the ore. The freight to the nearest port is greater than this and the lake freight is greater than either. These three items have steadily grown smaller. In 1867 it cost $4.25 to carry a ton of iron ore from Escanaba to Lake Erie; in 1870, $2.50; in 1894, 46 cents. In spite of these low rates the Commissioner of Navigation says that the shipping interests of the lakes suffered less from the hard times than any other branch of business. During 1895 the average rate must have been nearly double that of 1894, and 10 large new steamers have been ordered for next year, in addition to the eight which Mr. Rockefeller has ordered. The government is continually deepening the channels, and the average cost of freight, which is the main factor in the value of ore, must continue to fall. The large steamers now being built will carry 4,000 tons each, with a 14½ ft. draft; but when the channels shall have been made 20 ft. deep the same vessels can carry 6,000 to 7,000 tons. With this free waterway it is difficult to conceive of any combination being able to control the shipping available for the ore business, nor can the mines be monopolized. The output for 1895 will probably prove to have been over 10,000,000 tons, from the five districts—Marquette, Menominee, Gogebic, Vermilion and Mesaba. There are 150 different mining locations in these districts and the cost of mining varies from 25 cents to 75 cents a ton. The price of ore at Cleveland is likely to fall to $2 a ton, at which figure the American furnaces south of Lake Erie have a decided advantage over all foreign competitors. The Lake Superior ores are Bessemer ores; the English ironmaster has to mix in 20 per cent. of Spanish or Swedish ores costing him from $3 to $4 per ton. But if by any process of trust manipulation Lake Superior ores were made artifically dear, the very foundations of the coming American supremacy in iron and steel making would be at once undermined. Fortunately the enterprise seems beset with so many difficulties as to render its accomplishment improbable.—*Journal of Commerce.*

LOCOMOTIVE BUILDING.

The Buffalo Creek Railroad, which is a terminal line at Buffalo, N. Y., has issued specifications for three heavy switching engines.

CAR BUILDING.

The Boston & Maine has let a contract to the Pullman Car Co. for 30 day coaches.

The Mexican Railway has ordered 100 freight cars from the St. Charles Car Co.

The St. Charles Car Co. has the Mexican Central order for 150 box and 50 stock cars.

The Lehigh & Hudson River road has ordered three cars from Murray, Dougal & Co.

The Maine Central has placed an order for seven passenger cars with the Pullman Car Co.

The Quebec Central has ordered 100 freight cars from Rhodes, Curry & Co., of Amherst, N. S.

BRIDGE BUILDING.

Altoona, Pa.—Viewers have been appointed on a new county bridge over Clover Creek, in Woodbury township.

Braddock, Pa.—An application for a charter for the Braddock & Duquesne Bridge Company, formed to construct a highway bridge across the Monongahela River from Thirteenth street, Braddock, to a point near Kinney station, was made Jan. 8. This bridge will be used in connection with the Pittsburgh, Braddock & McKeesport Electric Railway Company, which was recently chartered by those interested in the bridge.

Brooklyn, N. Y.—The construction of a new bridge at Maspeth street has been ordered by the courts.

Buffalo, N. Y.—On Dec. 27 the Board of Public Works opened bids for the construction of piers, abutments and approaches for the lift bridge at Michigan street over the Buffalo River. The bids were: Delaney & Mullen, $48,000; Dwyer & McNaughton, $51,594; Hingston & Woods, $64,980, and the Buffalo Dredging Co., $54,495.

Carrollton, Ky.—A scheme has been started, which has for its object the construction of a bridge across the Kentucky River at this place. The plan is to secure a subscription of $20,000.

Chamberlain, S. D.—On Dec. 6 a bill was introduced in Congress asking for a charter for the Dakota-Pacific Bridge Co., which proposes to build a railroad and highway bridge across the Missouri near this place.

Charlestown, Mass.—The plans of the Boston Transit Commission for a bridge across the Charles from Charlestown to the city proper have been approved by the War Department at Washington. The plans provide for a bridge, the city limit of which will be Causeway street, not Haymarket square. The bridge to Causeway street will cost $1,500,000. The bridge is to be built with the view to its ultimate extension to Haymarket square.

Chicago, Ill.—It has been decided to place the four viaducts crossing the Illinois Central right of way at Madison, Van Buren and Harrison streets and Peck court. They will have easy grade approaches from Michigan avenue and other streets between those set apart for the main approaches. Foot passages will also be constructed at all streets entering Michigan avenue opposite the west line of the park.

Plans and specifications are completed for the new viaduct on Wells street over the Chicago & Northwestern tracks. This structure will be erected simultaneously with the remodeling of Wells street bridge to carry the Northwestern Elevated.

Denver, Colo.—At a meeting of the State Board of Construction held Dec. 31, eight different bids were opened for the construction of the Mesa and Gunnison county bridges. The contracts were not awarded. The amount appropriated to erect the Mesa county bridge is $4,000 and for the Gunnison county bridge $10,000. The state will pay $7,000 on the latter bridge, the county paying the remainder.

Detroit, Mich.—Keepers & Thacher, this city, will build the new bridge across the Rouge River between Springswell and Ecorse township.

Duluth, Minn.—Contracts for all the masonry work for the five bridges which the Duluth & Iron Range is about to build to replace wooden bridges between Two Harbors and Duluth have been let to the Barnett & Record Company, of Minneapolis and Superior. The Lassig Bridge & Iron Works, of Chicago, has secured the contract for the five superstructures. The bridges are, it is said, to be finished by the middle of next May.

East Liverpool, O.—Work was begun this week on the new Ohio River bridge at this point. It will be 1,400 ft. long and cost $225,000. The contract, which was awarded to John Sheader, of Pittsburgh, requires the completion of the bridge by Jan. 1, 1897.

Easton, Pa.—There is some talk of abandoning the bridge at the foot of South Tenth street and putting up a new bridge at Fourteenth street. This it is said would better accommodate the men who work in Odenweldertown.

Goldthwaite, Mills Co., Tex.—The contract for a bridge across the Pecan bayou has been awarded to the Flinn-Mayer bridge company, of Sherman, Tex., for $3,400. There was much opposition to the construction of this bridge, but the award of the contract would seem to indicate that it will now be built.

Hudson Co., N. J.—The old bridge over the New York & Greenwood Lake, at Kearney avenue, was last week declared unsafe by Engineer Blakeley, of Paterson, who examined it as an expert for the Hudson County Board of Freeholders. The railroad was informed of this finding, and a resolution requesting the indictment of the road has been sent to the Grand Jury.

Indianapolis, Ind.—Mr. Bart. Parker, Clerk of the Board of Public Works, writes that the contract for the plate girder bridge on Meridian street, over Pleasant Run, has been let to the Attica Bridge & Iron Company, of Attica, Ind., at a contract price of $3,990.

Knoxville, Tenn.—There has been some discussion of the necessity for a new bridge across the river at the foot of Gay street. The January session of the County Court will decide the matter.

Lewisburg, Pa.—A preliminary petition was presented recently to the County Commissioners by the citizens of Chillisquaque township for a free bridge between this town and East Lewisburg.

Miller's Falls, Mass.—The highway covered bridge over Miller's River, and connecting the towns of Montague and Erving, was washed away by high water on Jan. 2. The bridge was about 150 ft. long and had been standing many years. The cost of a new iron bridge is estimated at about $7,000.

Montreal, Que.—Press reports say that the Montreal Bridge Co., having a charter to build a bridge across the St. Lawrence from the east end of Montreal to Isle Ronde and the Longueuil side, has arranged with a New York syndicate for the construction of the bridge.

Nanticoke, Pa.—High water carried away a portion of one of the spans of the D., L. &. W. bridge over Harvey's Creek at this point last week. Repairs have been made.

New York.—The motion of Lawyer S. M. Haye on behalf of William Gordon, a Brooklyn taxpayer, to enjoin the New East River Bridge Commission and the Comptrollers of this city and Brooklyn from purchasing the property of the East River Bridge Company, was heard before Justice Gaynor in the Supreme Court on Jan. 7. This is the company of which Frederick Uhlmann is President, and we noted the intended purchase of its charter some weeks ago. Mr. Gordon claims that the object of the purchase is to benefit the Brooklyn Elevated Railroad Company, and he alleges that the transaction is fraudulent.

Niagara Falls, N. Y.—At a meeting of the Council held Dec. 30, resolutions were unanimously adopted against the building of a bridge between Buffalo and Grand Island. The resolutions were based upon the fact that the construction of the bridge will obstruct the navigation of the river.

Norfolk, Va.—There has been some talk here of a 760 ft. viaduct with a draw span between this city and the suburb, Berkeley, the said viaduct to be built across the eastern branch of the Elizabeth River. The project will become more definite should the legislature decide to make the suburb part of the city.

The extension of Granby street has made necessary a viaduct over Smith's Creek, and such a structure is now proposed 100 ft. long and 60 ft. wide.

Oregon, Ill.—There has been some talk of building a bridge across the Rock River at this place.

Peoria, Ill.—It is reported that a new steel highway bridge will probably be constructed across the Illinois River at this place during the coming year.

Philadelphia, Pa.—The Reading Railroad bridge over Hains street, just above the Germantown depot, is being replaced with a new double track structure.

Rankin, Pa.—The proposed bridge over the Monongahela at this point will, it is said, be 2,200 ft. long, with a 500-ft. channel span, and with approaches crossing the tracks of the Pennsylvania. The estimated cost of the bridge is $150,000.

Rock Island Arsenal, Ill.—Sealed proposals, in duplicate, upon blank forms, furnished here, will be received until 2 o'clock p. m., Monday, Feb. 3, 1896, for purchase of old superstructure of Rock Island bridge, consisting of about 5,626,760 lbs. wrought iron and steel. Information furnished upon applicatien to Col. A. R. Buffington, Ord. Dept., Comdg.

Saginaw, Mich.—The Flint & Pere Marquette will put footways on each of its two bridges over the Saginaw River. Proposals for the work will be received by R. W. Roberts, City Engineer, about Feb 1. The work has been ordered by the City Council.

Sandy Hill, N. Y.—A petition has been circulated asking the legislature for a lift bridge or a drawbridge over the canal in place of the Whitehall bridge on North Main street. Philip Beaulac is interested.

Scranton, Pa.—After passing first reading the West Lackawanna avenue viaduct ordinance has been recommitted to the Streets and Bridges Committee. The ordinance authorizes a public vote on the question of issuing city bonds to the amount of $150,000 to erect a viaduct over the Delaware, Lackawana & Western tracks on the southerly side of the avenue above mentioned.

Sioux City, Iowa.—The street committee has been empowered to call for bids for widening the Chambers street bridge. It is estimated that the work will cost about $2,000.

Superior, Wis.—A survey has been made by P. H. Smith for a new bridge over the Amicon River. It is proposed to build it during the coming spring.

Tonawanda, N. Y.—A meeting was held at the Town Hall on Grand Island, Jan. 3, to take action in regard to the Grand Island bridge bill. Resolutions in support of the measure were adopted.

Whately, Mass.—Press reports say that the selectmen have ordered an iron bridge built over Mill River on the South Deerfield road, to replace the one which recently failed.

Woonsocket, R. I.—City Engineer F. H. Mills in his annual report makes the recommendation that $15,000 be spent this year in the repair of bridges and the rebuilding of the old wooden bridge on River street. A new one of iron, to cost $12,000, is recommended.

Xenia, O.—Suit will probably be brought by this city against the Pan-Handle to compel them to erect a bridge over their tracks at Monroe street to connect with a $5,000 bridge built by the city.

Youngstown, O.—Bids are wanted until Jan. 25 for the superstructure of a bridge across the Mahoning River at Spring Common. C. F. Brenner, Auditor, may be addressed.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Central of New Jersey, quarterly, 1¼ per cent., payable Feb. 1.

Little Schuylkill Navigation, Railroad & Coal Co., 3¼ per cent., payable Jan. 20.

Texas Central, 3 per cent. on the preferred stock, payable Jan. 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Allentown, annual, company's office, Reading Terminal, Philadelphia, Jan. 13.

Central of Pennsylvania, annual, company's office, 304 Walnut street, Philadelphia, Jan. 13.

East Broad Top Railroad & Coal Co., annual, company's office, 320 Walnut street, Philadelphia, Jan. 13.

Jackson, Lansing & Saginaw, annual, office of Henry B. Ledyard, Michigan Central Station, Detroit, Mich., Jan. 24.

Mobile & Ohio, annual meeting of the holders of the general mortgage bonds, company's office, 11 Pine street, New York, Jan. 29.

New York & Middle Coal Field Railroad & Coal Co., annual, 228 South Third street, Philadelphia, Jan. 14.

New York, Pennsylvania & Ohio, annual, company's office, 121 Euclid avenue, Cleveland, O., Feb. 4.

North Pennsylvania, annual, company's office, 240 South Third street, Philadelphia, Jan. 13.

Pennsylvania & New York Canal & Railroad Co., annual, 228 South Third street, Philadelphia, Jan. 13.

Pickering Valley, annual, company's office, Reading Terminal, Philadelphia, Jan. 13.

Philadelphia & Baltimore Central, annual, company's office, Broad Street Station, Philadelphia, Jan. 13.

Philadelphia & Reading, annual, company's office, Reading Terminal, Philadelphia, Jan. 13.

Philadelphia & Wilmington, annual, Wilmington, Del., Jan. 13.

Pittsburgh & Eastern, annual, company's office, 141 South Fourth street, Philadelphia, Jan. 13.

Reading & Columbia, annual, company's office, Reading Terminal, Philadelphia, Jan. 13.

Schuylkill & Lehigh Valley, annual, 228 South Third street, Philadelphia, Jan. 13.

Western New York & Pennsylvania, company's office, 104 South Fifth street, Philadelphia, Jan. 13.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. S. T. Johnston, Monadnock Block, Chicago, is secretary of the association.

The *Engineers' Club of Columbus, (O.)*, meets at their rooms, at 12½ North High street, on the first and third Saturdays from September to June.

American Society of Civil Engineers.

As has already been announced the Annual Meeting of the American Society of Civil Engineers will take place in New York City, next week, Wednesday and Thursday. On Wednesday the usual business meetings will be held. Thursday morning there will be an excursion by rail to Ampere, returning in time for luncheon at the Society house. To this luncheon ladies are invited. Thursday afternoon is not especially assigned and Thursday evening there will be a reception at Delmonico's.

New York Railroad Club.

Mr. W. G. Wattson, Superintendent of the West Shore Railroad, has been elected Secretary of the New York Railroad Club by the Executive Committee, and has accepted the office. He succeeds Mr. John A. Hill, who has held that office for about four years. The present officers of the Club are: President, George W. West, of the New York, Ontario & Western; Vice-Presidents, A. E. Mitchell, of the Erie road; H. H. Vreeland, of the Metropolitan Railway Co., of New York, and C. M. Mendenhall, of the Philadelphia, Wilmington & Baltimore. Mr. C. A. Smith is Treasurer. The Executive Committee has been reduced from five to three members, and now consists of W. C. Ennis, W. W. Snow and W. G. Wattson, who were members of last year's committee. The Finance Committee, F. M. Patrick, R. M. Dixon and D. M. Brady, is unchanged.

Western Foundrymen's Association.

The next meeting of the Western Foundrymen's Association will take place at the Great Northern Hotel, Chicago, at 7:30 p. m., Wednesday, Jan. 15, 1896. The committee in charge of the publications of the Association is desirous of having topical discussions to be held bi-monthly, and announces the following for the next meeting:

"Does the employer derive any benefit from compelling molders to remain in the foundry until quitting time, if their molds have been poured off before? If so, what benefit?"

"Are there characteristic conditions in foundries which necessitate different practice and managent from those followed in other industrial pursuits?"

"Is a molder in fit condition to do further work after he has poured off his day's molding?"

"Is it desirable to have a recognized apprenticeship system, and, if so, what is the best form?"

Discussion on Mr. Dingey's paper on "The care of Patterns and Pattern Account," will be continued before beginning the topical discussion.

PERSONAL.

—Mr. F. C. Gates has been appointed Acting Purchasing Agent of the Wheeling & Lake Erie road, vice Mr. F. S. Deal, retired temporarily on account of illness.

—W. N. Seibert, of New Bloomfield, Pa., on account of press of business, has resigned as Treasurer of the Perry County road, a short line in Pennsylvania. His successor has not been selected.

—Mr. John Warwick has been appointed General Purchasing Agent for the railroads comprising the Seaboard Air Line, with headquarters at Portsmouth, Va. He has recently held a similar position on the Chicago Great Western.

—Mr. R. M. Hannaford has been appointed Bridge Engineer of the Grand Trunk Railway, with office at Montreal. Mr. Hannaford was for some time with the Phœnix Bridge Co., of Phœnixville, Pa., where he obtained valuable practical experience.

—Capt. J. M. Tibbetts, a well-known railroad man in Colorado, who formerly held important positions in the traffic departments of a number of roads in that state, and was General Freight and Passenger Agent of several companies, died at Pueblo, Col., on Jan. 4.

—General Freight Agent A. H. McLeod, of the Cincinnati, Hamilton & Dayton road, has been promoted to the position of Traffic Manager of the road. Mr. McLeod has been General Freight Agent since 1875. Before that he was connected with a fast freight line.

—Mr. J. J. Kirby, heretofore Traveling Passenger Agent of the Ann Arbor road, has been appointed General Passenger Agent of the company. He has been with the Ann Arbor road in its traffic department for a number of years, and formerly was in the freight office of the Pennsylvania at Toledo.

—Mr. William F. Burns, one of the oldest members of the Finance Committee of the Baltimore & Ohio, has resigned, owing to ill health. It is believed he will also resign from the Board of Directors, and that some member of the New York banking houses interested in the company will take his place.

—Mr. E. S. Washburn is now Vice President of the Kansas City, Fort Scott & Memphis, and the office formerly held by him, that of Freight Traffic Manager, has been abolished. Mr. Washburn went to this road in 1891 from the Cleveland, Cincinnati, Chicago & St. Louis, where he had been Freight Traffic Manager.

—Mr. William R. McKeen, for more than 25 years President of the Vandalia, will retire at the annual election, Jan. 15, according to a current rumor, which says further that Vice-President and General Manager John C. Williams and General Superintendent N. K. Elliott will also retire at the annual election.

—Mr. J. N. Ross, Superintendent of the Sixth Division of the Southern Railway Company, with headquarters at Birmingham, Ala., has resigned. Mr. Ross has been Superintendent at Birmingham for a year and a half, succeeding W. B. Ryder, when the latter was transferred to the Third Division at Charlotte, N. C. For two years prior to that time he was Trainmaster.

—Mr. George B. Parke has retired as Treasurer of the Toledo, Ann Arbor & North Michigan Railroad, the Treasurer's department of the new company, the Ann Arbor Railroad, having been removed to New York City. Mr. Parke has been in the service of the company ever since it began running trains in 1878. He has been Car Accountant, Assistant Auditor and Auditor, and finally Treasurer of the company.

—Mr. A. F. Frazer, Superintendent of the Alabama Great Southern at Birmingham, has been appointed Superintendent of the Sixth Division of the Southern Railway Company, to succeed J. N. Ross, resigned. Trainmaster C. A. Wickersham, who had charge of the terminals of the Southern Railway in Atlanta during the Exposition, and who was formerly Trainmaster at Columbus, Miss., succeeds Mr. Frazer on the Alabama Great Southern.

—Mr. F. H. Hamilton has been appointed treasurer of the receivers of the St. Louis & San Francisco, with office in New York City. He succeeds Mr. H. W. Gardiner, who is now Assistant Treasurer of the Atchison, Topeka & Santa Fe. Mr. Hamilton has been acting as cashier in the New York office of the receivers of the Atchison and the St. Louis & San Francisco, and has for many years been connected with the Eastern office of those companies.

—Mr. H. A. Riggs, Chief Engineer of the Toledo, Ann Arbor & North Michigan, has resigned. The Ann Arbor Railroad, which is a reorganization of the former company, and has now taken possession of the property, will have no Chief Engineer. Mr. Riggs will open an office as Consulting Civil Engineer at Toledo. He has been with the Ann Arbor road since 1890 as Chief Engineer, and before that was on the Burlington & Missouri River and on construction work on the Atchison, Topeka & Santa Fe.

—Mr. L. F. Parker, formerly a well-known railroad official, died Dec. 31, at Worcester, Mass. He commenced railroading in Boston for the National Despatch Line, and was afterward Assistant General Freight Agent of the Atchison, Topeka & Santa Fe; Freight Traffic Manager of the Fitchburg; General Freight and Passenger Agent of the Mexican Central, and General Freight Agent of the Great Northern. For the last three years he has been in the manufacturing business in Worcester.

—Mr. Samuel G. Hatch has been recently appointed General Passenger Agent of the Chesapeake, Ohio & Southwestern, succeeding Mr. T. B. Lynch, who has resigned to go to the Missouri, Kansas & Texas as Chief Clerk of the Passenger Department, a more lucrative position. Colonel Hatch has been District Passenger Agent at Memphis for the last year. Before that he was District Passenger Agent of the St. Louis Southwestern at St. Louis, going to the company in 1887. He began railroad work in 1880 on the St Louis, Keokuk & Southwestern at Keokuk, and remained with that company a number of years.

—Mr. A. M. Tucker, who has been General Manager of the New York, Pennsylvania & Ohio and its leased lines, has been made General Agent of the new Erie Railroad Company at Cleveland, O. The former office has been abolished and that title no longer exists on any of the Erie lines. The operating department of the lines now included in the New York, Pennsylvania & Ohio will be in charge of Mr. J. C. Moorehead as General Superintendent, his jurisdiction including all the lines west of Salamanca, N. Y. The Erie lines east of Salamanca will also be in direct charge of a General Superintendent, Mr. C. R. Fitch continuing in that office.

—Major James Clarence Post, Corps of Engineers United States Army, died in New York Dec. 7. He was born in New York City in 1844, and graduated from the United States Military Academy at West Point in 1865. His career has been that of the typical officer of the United States engineers in time of peace—that is, he has performed a great variety of duties all over the United States, and at one time he was military attaché to the United States Legation in London. He was a member of the University Club in New York, and became a member of the American Society of Civil Engineers in 1878.

—Mr. George Olds, General Traffic Manager of the Canadian Pacific, has been relieved from active service at his own request. Mr. Olds is now over 60 years old and has been in railroad service over 40 years. His retirement has been anticipated, as it was published several weeks ago that he had asked President Van Horne to relieve him. Upon his retirement the office which he held, that of General Traffic Manager, was abolished and hereafter the traffic department will be in charge of a Freight Traffic Manager, Mr. G. N. Bosworth, who has held that office for some time, and a Passenger Traffic Manager. Mr. D. McNicoll, the present General Passenger Agent, has been appointed Passenger Traffic Manager.

—Mr. L. T. Myers, of Richmond, Va., was last week appointed Assistant General Superintendent of the United States Railroad Mail Service. Mr. Myers is a son of Major E. T. D. Myers, President of the Richmond, Fredericksburgh & Potomac Railroad. Mr. Myers was until recently General Superintendent of the Seaboard Air Line, and he has held other responsible positions on Southern railroads. He went to the Seaboard Air Line in 1885, and was Superintendent of Transportation until 1890, when he was promoted to be General Superintendent. He is now about 40 years old.

—Mr. George W. Parker, President and General Manager of the St. Louis, Alton & Terre Haute, has resigned the latter office, and has retired from active service with the company. He has been its chief executive officer for over 26 years. He is to go to Europe for seven or eight months, and he has issued the following circular announcing his retirement and the appointment of his son to be General Manager:

"After thirty-odd years of continuous service with this company, I have decided to relinquish the active management of the property to my assistant, Mr. C. F. Parker, and take a much needed rest. To that end I am going abroad soon, to be absent several months, and take this occasion to speak an affectionate "good-bye" to every employee of the company, and also to bespeak for my successor the same efficient support which you have so loyally and cheerfully accorded to myself."

—Mr. W. C. Brown last week assumed his new duties as General Manager of the Chicago, Burlington & Quincy road at Chicago. The promotion of Mr. Brown to the office of General Manager of the company has resulted in a number of promotions on the Missouri lines. Mr. Howard Elliott, at present General Freight Agent, succeeds Mr. Brown as General Manager of the lines, which include the Hannibal & St. Joseph, the Kansas City, St. Joseph & Council Bluffs, the St. Louis, Keokuk & Southwestern and the Chicago, Burlington & Kansas City. Mr. D. O. Ives, at present General Passenger Agent, a position which Mr. Elliott held before being transferred to the freight department, has been made General Freight Agent, and his successor as General Passenger Agent is Mr. L. W. Wakeley, who was previously Assistant General Freight Agent of the Chicago, Burlington & Quincy at Chicago. The latter officer has been with the Burlington since 1881, beginning as clerk in the general freight office. He has been Local Freight Agent at Chicago, Assistant to the former General Manager, Mr. Stone, and since 1888 Assistant General Passenger Agent The Burlington lines in Missouri include about 1,200 miles of road.

—Sir Edward J. Harland, head of the great ship building and engineering firm of Harland & Wolff, died at his home in Ireland Dec. 23. Sir Edward Harland was born in 1831, the son of a physician in Scarborough. He early showed strong mechanical tastes, and at the age of 15 was apprenticed to Messrs. Robert Stephenson & Co., of Newcastle-on-Tyne, who were then the foremost builders of locomotives and other engines. After his apprenticeship, he went as draughtsman with Messrs. J. & G. Thomson on the Clyde, and served in other shipbuilding concerns, and finally, in 1858, at the age of 27, acquired the Belfast shipyard, then carried on by Robert Hickson & Co. In 1860 Mr. G. W. Wolff became a partner with Mr. Harland. In the course of three or four years they built 20 steamers besides a good many sailing vessels. To Americans the name of this firm is well known as the builders of the White Star steamers, which vessels they not only built complete but engined. The entire fleet of the White Star line was built in the yards of Harland & Wolff, the first, the Oceanic, 420 ft. long, having been launched in 1870. This fleet includes not only the famous passenger steamers plying between New York and Liverpool, but the freight steamers and cattle steamers built in recent years for the Transatlantic trade, and a number of freighters for the New Zealand trade. The works at Queen's Island now cover nearly 80 acres, and in 1892 they turned out 14 steel vessels aggregating 68,614 tons. In the amount of tonnage built they have stood among the first two or three firms of the world. Mr. Harland was made a baronet in 1885.

—Mr. Alfred E. Beach, for nearly 50 years one of the editors of the *Scientific American*, died at his home in New York City on Jan. 1, aged 70 years. Mr. Beach was the son of Moses Y. Beach, who established the New York *Sun*, but outside of a short time in his father's office, his entire business life had been as a member of the patent soliciting firm of Munn & Co., which he established in 1846 with his former schoolmate, A. D. Munn. The firm purchased the *Scientific American*, and its editorship was undertaken by Mr. Beach, and he has been its responsible editor all these years. But neither that work, nor the direction of the extensive patent business of the firm, absorbed all his energies. The list of his inventions is an important one, and would alone have given him distinction. He was a man of remarkable energy, with an active mind, of natural mechanical bent, which well fitted him for his business. As early as 1852 he exhibited a typewriting machine, which received a gold medal at the Crystal Palace exhibition in New York as one of the most important and ingenious inventions exhibited. It had practically all the devices of the present typewriting machines. He devised a pneumatic tube system for carrying mails, and a pneumatic railroad of which an experimental section (elevated) was put in operation. The Beach Pneumatic Transit Co., of which Mr. Beach was President, built a section of underground road in Broadway, New York, in 1869, being part of an underground pneumatic system which he planned. This section of road was built without interfering with street traffic, by the Beach hydraulic shield, the parent of those used at the St. Clair tunnel, on the City & South London underground road and elsewhere.

—Mr. Russell Wadsworth Hildreth died on Dec. 23 at his home in New York of heart failure, as a result of typhoid fever, after an illness of three weeks. He was born in New York City Feb. 12, 1865, and was graduated from the School of Mines, Columbia College, in 1885, with high honors. He at once entered the office of George S. Morison, and served him successively as draftsman, inspector of shop work of his large bridges at Nebraska City, Sioux City, Omaha and Cairo, beside less important structures, and as assistant engineer on the Omaha Bridge. In 1887 he formed the firm of Hildreth & Nettleton, inspecting and civil engineers, with William A. Nettleton, now Master Mechanic of the Kansas City, Ft. Scott & Memphis, which in 1889 became, owing to the illness and retirement of Mr. Nettleton, R. W. Hildreth & Co., with Mr. P. S. Hildreth as partner. This firm has inspected many well-known bridges and steel-framed buildings, including the New London drawbridge, the Red Rock cantilever, and the 155th street viaduct and Central bridges at New York, the elevated railroads in Brooklyn and Baltimore, and terminals in Chicago, Boston and Providence, besides acting as inspecting or consulting bridge engineers for leading railroads, a number of foreign roads, and for various cities, and also as consulting mechanical engineers and inspectors for local and several large foreign mining, electrical and manufacturing corporations. Mr. Hildreth was widely and favorably known among engineers, railroad men and architects as an expert on designing, materials of construction and machine shop products. He was a Junior of the American Society of Civil Engineers, posted for election to full membership, a member of the American Society of Mechanical and of Mining Engineers, and a member of the Engineers' Club. When the New York Rapid Transit Commission was receiving suggestions from engineers, Mr. Hildreth submitted plans and estimates for a high elevated railroad running over the houses in the middle of the blocks. His suggestions were highly thought of. At the time of his death he was a member of the Committee in charge of revising that portion of the Building Laws relating to steel framed building construction in New York. He was shortly to have been married.

ELECTIONS AND APPOINTMENTS.

Alabama Great Southern.—C. A. Wickersham has been appointed Superintendent, vice A. J. Frazer, resigned to accept service with the Southern Railway Company.

Augusta & Savannah.—The stockholders elected the following Directors at Savannah on Jan. 6: A. R. Lawton, George A. Owens, Frank H. Miller, Wm. W. Thomas, Josh. D. Weed, Frank S. Lathrop and Henry H. Hull. Gen. A. R. Lawton was re-elected President.

Baltimore, Chesapeake & Atlantic.—Captain Willard Thomson, the General Manager, will hereafter also act as General Freight and Passenger Agent, in addition to performing the duties of General Manager. B. L. Fleming having resigned. Andrew Hunter will act as Cashier in addition to being Auditor. A. J. Benjamin has been appointed Freight and Passenger Agent, railroad division, in addition to the duties of Superintendent, with headquarters at Salisbury, Md.

Baltimore & Ohio.—Charles O. Scull, General Passenger Agent, has divided the territory heretofore under the jurisdiction of the General Eastern Passenger Agent into two districts. A. J. Simmons will be the General New England Passenger Agent, with headquarters in Boston, and Lyman McCarty the General Eastern Passenger Agent, with office in New York City.

Boston & Lowell.—At the annual meeting of the stockholders of the railroad at Boston on Jan. 1, the directors were re-elected, the only change from last year being the substitution of George A. Gardner for William Powell Mason.

Canadian Pacific.—The resignation of George Olds, General Traffic Manager of the company, has made necessary some changes. The position of General Traffic Manager has been abolished, and G. M. Bosworth has been appointed Freight Traffic Manager, with charge of freight traffic on all the company's lines. D. McNichol has been appointed Passenger Traffic Manager on all the company's lines. They will have their offices in Montreal. Robert Kerr has been appointed Traffic Manager of the company's lines west of Fort William, with an office at Winnipeg.

Chicago, Milwaukee & St. Paul.—At the meeting of the Board of Directors, held on Dec. 26, Mr. Albert J. Earling was elected Second Vice-President, and will discharge the duties of that office in addition to his duties as General Manager.

Cleveland, Cincinnati, Chicago & St. Louis.—Notice has been issued of the appointment of George Tozzer to the position of Assistant Purchasing Agent.

Hannibal & St. Joseph.—The following appointments are announced under date of Jan. 1: Howard Elliott appointed General Manager, vice Mr. W. C. Brown, resigned; Mr. D. O. Ives appointed General Freight Agent and Mr. L. W. Wakeley appointed General Passenger Agent, vice D. O. Ives, promoted. These officers have jurisdiction on the Hannibal & St. Joseph; St. Louis, Keokuk & Northwestern; Kansas City, St. Joseph & Council Bluffs, and Chicago, Burlington & Kansas City roads.

Indiana, Decatur & Western.—The following appointments are announced by President Woodford, of the Cincinnati, Hamilton & Dayton, who recently became President of this company: F. H. Short has been elected Treasurer of this company, with office at Cincinnati; G. W. Lishawa has been appointed Auditor, with office at Cincinnati, vice Mr. A. P. Lewis, resigned; George R. Balch is Secretary of the company, and has also been appointed Purchasing Agent, with office at Cincinnati, vice Mr. C. B. McVey, resigned.

International & Great Northern.—The following appointments of Roadmasters are announced: M. McDonough, Roadmaster, with charge of all main line and branches of the Gulf division north of Trinity, with office at Palestine, Tex.; R. Gaunt, Roadmaster of the main line and branches of the Gulf division south of Trinity, with headquarters at Trinity; Mr. R. G. Scott, Roadmaster, will have charge of main line of the San Antonio division south of Austin, with headquarters at San Antonio; E. Bates, Roadmaster of the main line and branches of the San Antonio division north of Austin, with headquarters at Taylor. The offices of Assistant Roadmaster are abolished.

Jacksonville, Louisville & St. Louis.—A meeting of the stockholders was held in Jacksonville, Ill., recently, and Robert F. Kennedy, J. Henry Dunn, of Philadelphia, Pa.; Henry A. Gardner, of Chicago; Isaac L. Morrison and Marcus Hook, of Jacksonville, were elected Directors. At a meeting of the Directors held afterward the following officers were elected: President, Robert F. Henry; Vice-President and Treasurer, J. Henry Dunn; Secretary, Henry A. Gardner.

Kansas City, Fort Scott & Memphis.—Edward S. Washburn having been elected Vice-President, the office of Freight Traffic Manager has been abolished. The Vice-President will have charge of all traffic matters of the above and associated companies, and in addition will perform such other duties as may be assigned to him by the President. The headquarters of the Vice-President will be at Kansas City, Mo.

Lehigh Valley.—W. W. Atwood has been appointed Assistant Train Master of the Pennsylvania & New York division.

Ira B. Tice, Yard Master at Perth Amboy, has been appointed General Yard Master at that point.

Nashville, Chattanooga & St. Louis.—The Paducah, Tennessee & Alabama Railroad and the Tennessee Midland Railway having been leased by this company, they will be operated as the Memphis & Paducah Division of the Nashville, Chattanooga & St. Louis Railway, and the jurisdiction of its General Officers extended over these lines, with the following Division Officers: W. J. Hills, Superintendent, Paducah, Ky.; Geo. McFadden, Division Freight Agent, Memphis, Tenn.; and A. J. Welch, Division Passenger Agent, Memphis, Tenn.

Ohio River.—A. H. Thorp has been appointed Assistant to the General Manager and Purchasing Agent, with office at Parkersburg, W. Va.

Mr. J. B. Hopper is appointed Trainmaster, vice W. W. Wickham, assigned to other duties.

Seaboard Air Line.—The office of General Storekeeper of the railroads comprising the Seaboard Air Line has been abolished. John Warwick has been appointed Purchasing Agent.

Southern.—A. J. Frazer has been appointed Superintendent of the Sixth Division, vice J. N. Ross, resigned, effective from Jan. 1.

St. Louis, Alton & Terre Haute.—C. F. Parker, heretofore Assistant General Manager, has been appointed General Manager of the roads operated by this company. The office of Assistant General Manager has been abolished.

St. Louis & Eastern.—President W. E. Guy announces that the North & South Illinois road will hereafter be operated by this company with the following officers: L. S. Graves, Superintendent, General Freight and Passenger Agent; A. J. Moorshead, Secretary; J. C. Howe, Auditor and Treasurer; F. G. Jonah, Resident Engineer and Roadmaster; William Dunn, Assistant Roadmaster.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Albemarle.—This company has secured a charter from the Virginia Legislature, to build a road from Alberene, Albermarle County, to any point on the Southern road. The incorporators are W. E. Payne, George W. Bostwick, Hanford R. Nash, James H. Serene and Frank L. Felter.

Aransas Pass Northern.—The engineering work on this road, not already completed, is to be taken up at once, so that active construction may not be delayed. The road is projected in connection with the deep water improvements at Aransas Pass, for which Alexander Brown & Sons, the Baltimore bankers, are furnishing the funds. All the stock of the railroad company has been subscribed and the required amount paid in. The new road will extend from Aransas Pass northward, connecting with the Missouri, Kansas & Texas and the International & Great Northern roads, probably at Smithville.

Big Stony.—This road, in the western part of Virginia, near the West Virginia state line, has been completed from Ripplemead, in Giles County, to Houghton, a distance of 10½ miles. The Big Stony Mining Company will begin soon to ship ore from the mines which the new road reaches.

Bristol Terminal.—This company has been incorporated by the Virginia Legislature, to build a road in the City of Bristol and to connect the tracks of all the railroads within the city. Also to construct and maintain stations and all necessary terminal facilities. The incorporators are: Sam'l R. Shipley, Henry W. Flounoy. Rufus A. Ayers, Edward P. Borden and George Burnham.

Brooklyn & Brighton Beach.—The directors and stockholders of the company will meet on Jan. 30, for the purpose of voting on the proposed connection to be built from the Brooklyn terminus, at Franklin and Atlantic avenues in Brooklyn, to the Kings County Elevated road in Fulton street, and the stockholders of the Kings County Elevated road will meet to ratify the agreement on Feb. 6. Work on the connection, connecting the elevated road with the surface line, between the two roads, will be pushed forward rapidly, and when completed through trains will be run from the Brooklyn Bridge to Brighton Beach.

Buffalo & Susquehanna.—Last week the company opened for general traffic its extension from Galeton to Perryville, Pa., 25 miles, and to Wellsville, N. Y., 37 miles, the last 12 miles not being new road. By the new line connection is made at Ansonia with the Fall Brook for Williamsport, and at Galeton with the Addison & Pennsylvania. The road has two main divisions and a 13-mile branch to Cross Fork. The Genesee division from Wellsville to Ansonia is 50.26 miles in length. From Galeton to Ansonia it is 13.24 miles. The Susquehanna division, from Galeton to Keating Summit, is 48.74 miles long. Beginning at Galeton, the new line follows Main Pine Creek up to Brookland, then crosses the summit at an elevation of 2,360 ft. above tidewater. It follows the Genesee River down through Newfield to West Bingham and Hickox, or Perryville, where it connects with the Wellsville, Coudersport & Pine Creek road, which was purchased by the Goodyear Brothers, of Buffalo, the owners of the above road, several months ago. The office of Chief Engineer H. Herden will be at Galeton, Pa.

Chesapeake & Western.—It is expected that the track-laying will be completed on the first section 27 miles long, some time next week. This is east and west of Harrisonburg from Elkton to Bridgewater. This section will be ready for operation by Feb. 15. It connects with the Norfolk & Western at Elkton, its eastern terminus, and at Harrisonburg with the Baltimore & Ohio. The equipment has been purchased. Altogether about 275 miles of the road has been surveyed to the Chesapeake Bay and west to the Virginia state line. The work now under way is being done by the Old Dominion Construction Co., of 15 Broad street, New York. J. W. Reinhart is President of the railroad, with office also at 15 Broad street, New York.

Cleveland & Southwestern.—This company was incorporated at Columbus, O., last week, to build a line of road from York, Medina County, to the western boundary of Ohio with headquarters at Bucyrus, O., on the line of the Toledo & Ohio Central. The route from York is for distance in close proximity to the Wheeling & Lake Erie and the Cleveland, Lorain & Wheeling roads.

Dallas Terminal.—Trains are now running on part of this road at Dallas, Tex. The five miles now completed and ready for operation have 60-lb. rails laid upon oak ties. The total length of the belt is to be 10 miles.

Hammond & Blue Island.—About four miles of track at Hammond has been built this year by this company, and 13 miles additional has been graded. The primary object of the line is to facilitate the movement of the G. H. Hammond Company's products. This company has packing houses at Kansas City, Omaha and Hammond, Ind. It buys stock in St. Louis and Kansas City for all the different houses. The delay in getting stock from the Western roads to the Hammond plant sometimes amounted to 48 hours going through the stock yards. The company, therefore, determined to build a connection of its own to Eastern and Western roads. The new line will do a general freight transfer business, and will undoubtedly carry passengers in connection with other lines entering the city of Chicago. The length of the road as projected is about 17 miles. The same company also own the Northern Indiana road which has tracks and connections with the various railroads intersecting at Hammond. At this place there are now about twelve miles of track. The company now owns two locomotives.

Louisville, New Albany & Chicago.—Engineers said to be in the employ of this company are locating a connecting short line from Greencastle to Linton, Ind. The line is on the west side of Eel River, located two miles west of Poland and one mile west of Bowling Green. It is said to be the intention to utilize several miles of the old Wabash and Erie towpath in the county.

Mexican & Guatemala.—The Mexican Government, according to press reports, has granted to an American company, organized under this name, the concession to build a road from Tonalo to Tuxtla and from St. Geronimo to the frontier of Guatemala. The distance is 450 English miles, passing through the states of Oaxaca and Chiapas. It is said the governments, federal and state, have granted a subsidy of $5,000,000. The President of the company is R P. Porter, of Cleveland, ex-Superintendent of the United States Census; Treasurer, Hon. S. W. Allerton, of Chicago; Vice-President and General Manager, H. N. Barry, of Philadelphia.

New England.—The correspondent of the New York *Evening Post* at New Haven, says that the New York, New Haven & Hartford road has decided to extend the Norwich & Worcester, which is leased to and operated by the New England road, from its present southern terminus at Allyn's Point, Conn., southward to Groton, about six miles. Groton is on the east side of the Thames River, opposite New London, and the new road which has been talked of many times before, would enable trains of the New England to run from Boston and Worcester into Groton over the company's own tracks, and from Groton the New York, New Haven & Hartford connects with New London by the bridge over the Thames. At present these trains run over the New London Northern between Norwich and New London (on the west side of the river) the line from Norwich to Allyn's Point, on the east side, being used only for freight. It is also stated that the company may build a line three miles long between Baltic and Taftville and thus make a line between Willimantic and New London practically parallel to the New London Northern. Willimantic is a large manufacturing town about 26 miles from New London.

New Roads.—The logging railroad built by O'Neal Bros. from Mille Lacs to Knife Lake, in Northern Minnesota, has been completed and the builders are now hauling logs over it. The road is 13 miles long, but the intention is to add to its length each year until all available timber has been removed.

Pennsylvania.—The company expects to run trains across the new Delaware River bridge by Feb. 1. This will enable the company to operate through trains from the Broad Street Station, Philadelphia, to Atlantic City and the Jersey Coast resorts.

It is said that the company has decided to build a new track in order to avoid what is known as Trimmers Rock, near Harrisburg, and the long curve at that point where some serious accidents have happened. It will be necessary to build two iron bridges across the canal.

Pennsylvania Midland.—The court has made an order directing Col. John W. Rutherford, of New York, receiver of the property, to complete the main line through Bedford County, Pennsylvania, and issue $200,000 of certificates, not more than $50,000 of it to be used to pay the preferred claims set forth in the bondholders' agreement of Oct. 29, 1895, the balance to be expended in completing the road, which is practically graded to Brook's Mills. The line runs through some fertile farms of Bedford and Blair counties.

Peoria.—This company recently organized at Galena, Kan., has filed its charter at Topeka, to build a standard gage road from Galena to Chetopa. The distance is about 45 miles through Cherokee County, Kan., Jasper County, Mo., and the Peoria Reservation in the Indian Territory. The directors are as follows: H. W. Moore, L. J. Haines and B. Cooley, of Galena; J. P. McNaughton, of Max, I. T., and W. E. Turkington, of Cherokee.

San Francisco & San Joaquin Valley.—Contracts for 18,000 tons of rails, 300,000 ties and 500,000 ft. of lumber will be awarded the latter part of January. This material will be used in constructing the 175 miles of road between Fresno and Bakersfield, the proposed terminus of the road. All the material is expected to be on hand by July and the road to be ready for business in time to move this year's wheat crop.

Spartanburg.—A company of capitalists of Spartanburg, S. C., has been formed to build a branch road to the Seaboard Air Line, 24 miles long. This will give the Seaboard Air Line a connection with Spartanburg, one of the principal mill cities of the South and one of the largest cotton manufacturing cities. If the Port Royal & Western Carolina road is separated from the Southern by order of the court, the new road can be connected with it, giving a new independent route by the way of the Seaboard to Augusta, Ga., and Port Royal, S. C. Mayor Galvert, of Spartanburg, is President of the company. Surveys are now being made.

Electric Railroad Construction.

Asbury Park, N. J.—William L. Dayton, of Trenton, N. J., has been appointed Receiver of the Asbury Park & Belmar Street Railway Co.

Baltimore, Md.—The City and Suburban Railway Co. has been granted a franchise to build a new line from the city limits to Hammond's Ferry road. F. D. Shaffer is purchasing agent. The office of the company is at York road and Carroll avenue, Baltimore, Md.

The Baltimore & Gunpowder Electric Railway Co. has been granted a franchise for a line from the eastern limits of Baltimore to the Gunpowder Falls. Among those interested are James Young, James Gilmore, C. B. McClean and F. J. Schneider.

Baltimore, Md.—David Newbold, John Hubner and R. S. Carswell, of Baltimore, have been appointed a committee by the Baltimore & Catonsville Construction Company to receive bids for power house equipment for the Columbia & Maryland Electric Railroad.

Batavia, N. Y.—The franchise and right of way have been secured for the Batavia Electric Railway. Work will be commenced in March, and the road is to be completed by July.

Belleville, Ont.—The Belleville Traction Co. (Ltd.) has been incorporated to build an electric railroad in Belleville. Incorporators: S. A. Lazier, T. C. Lazier, R. C. Lazier, S. S. Lazier and S. D. Lazier.

Binghamton, N. Y.—The new electric line between this city and Union will run freight cars once daily.

Brooklyn.—At the final meeting last week of the Board of Aldermen all applications for electric railroads were rejected. Judge Gaynor, of the Supreme Court, had granted an injunction enjoining the board from granting a franchise to the East River & Atlantic Ocean Railroad Co.

Charleston, W. Va.—The Charleston Electric Railway & Power Co. has been incorporated by Neil Robinson, E. S. Buttrick and others, with a capital stock of $500,000.

Chicago.—The North Chicago Street Railway Company has declared an extra dividend of 20 per cent. upon the $5,500,000 capital stock of the company. Ten per cent. will be given as a stock bonus, and 10 per cent. in 6 per cent. debentures. The directors also voted an increase of $550,000 in the capital stock of the company, for which stockholders will be allowed to subscribe pro rata at par.

The Hammond, East Chicago & Whiting Electric Street Railway has been sold to Columbus R. Cummings, of the South Chicago Street Railroad Co. for about $500,000.

The Rockford Traction Co. has been incorporated, with a capital stock of $300,000, by C. H. Moore, H. L. Jewell and W. F. Burns.

The Suburban Electric Railway Co is building an electric road to La Grange. About five miles of track has been laid, 65-lb. T-rails being used. An agreement has been made with the Metropolitan Elevated Co whereby the surface trains of the former company are to be carried to the level of the elevated superstructure by an inclined plane, then hauled by the trains of the Metropolitan into the city. The connections are to be made both at West Forty-eighth and Harrison streets, the present terminus of the "L" line, and at West Forty-eighth and Twenty-second streets, the terminus of the southwest branch of the elevated road, when it is completed.

Cincinnati, O.—The Directors of the Cincinnati Street Railway Co. have decided upon another issue of new stock. The amount of the new issue is $250,000 and it will be issued to stockholders. With this issue the total amount of the stock will be $10,500,000.

Cleveland, O.—Thomas F. Welch has been granted a franchise for the Akron & Cuyahoga Falls Rapid Transit Co., for an electric railroad from Barberton to Hametown. The new line is to run to Wadsworth in Wayne County. When it is completed the A. C. T. Company will have a line 26 miles long.

Detroit, Mich.—The Common Council has granted a 30-year franchise to the Detroit Citizens' Street Railway Co., at the head of which is ex-Congressman Tom L. Johnson. The ordinance provides for eight tickets for 25 cents, good at all hours, with a five-cent fare for a transfer. It is expected the Mayor will veto the ordinance, as he is trying to get a three-cent fare bill passed.

Germantown, Pa.—The bids for the work of the construction of the Delaware & Schuylkill Electric Railroad have been received, and the contracts will soon be awarded. The road, which will be about eight miles long, will extend from Frankford, past Tabor and Wister Stations and Manheim Park to Germantown, crossing the Willow Grove line at Olney. It is to be a single track line with turnouts at short distances apart. Henry C. Forrest is President of the company.

Hartford, Conn.—F. S. Levy, of Springfield, has secured the contract for building five and one-half miles of the Hartford, Manchester & Rockville Tramway.

Jersey City, N. J.—The Sprague Electric Railway Company has been incorporated by Edward C. Platt, of Brooklyn, N. Y.; Frank J. Sprague, Charles M. Sprague and Charles Benton, of New York City, and Howard F. Curney, of this city. The capital stock is $1,000,000, of which $1,000 has been paid in.

Lebanon, Pa.—It has been decided to extend the Lebanon and Myerstown electric steet railroad to Womelsdorf, and connect it with the proposed road from Womelsdorf to Reading. The distance is 6¼ miles along the Berks and Dauphin turnpike, and the work of constructing the new line will be commenced at once.

Lewis, Del.—Work has been begun on the electric railroad between Lewes and Rehoboth. The line, which will be about six miles long, will be along the beach. The Lewes terminus will be on the beach opposite the town, south of the Delaware, Maryland & Virginia Railroad tracks.

Little Falls, N. Y.—The Highway Commissioners of the town of Columbia have voted to grant the franchise asked for by the Little Falls & Richfield Springs Electric Railroad.

Los Angeles, Cal.—The stockholders of the Main Street Agricultural Park Street Railway have voted to increase the capital stock from $200,000 to $500,000 for improvements.

Meadville, Pa.—The Saegertown & Venango Street Railway Co. has been chartered to build an electric railroad eight miles long from Meadville to Venango. The capital is $72,000. The Meadville & Saegertown Railway Company has also been chartered to build a line four miles long from Meadville to Peffertown, with a capital of $34,000.

Milwaukee, Wis.—The Milwaukee, Racine & Kenosha Street Railway Co. was incorporated Dec. 30, with a capital of $100,000, to build an electric railroad from Cudahy, through Racine and Kenosha to the Illinois state line. The principal men interested are Matthew Slush, of Mount Clemens, Mich., and A. W. Bishop, of Cleveland, O. The officers of the company are: Matthew Slush, President; A. W. Bishop, Vice-President and Treasurer, and Thomas M. Kearney, Secretary. The road will be completed within a year if the right of way can be secured. The company propose to carry passengers, express matter and mail.

Montreal, Que.—The Street Railroad Co. has been granted the permission by the road committee to build a line on Mount Royal avenue. The extension will require about four miles of additional track.

New Haven, Conn.—The Middletown Electric Railway Co. has bought out the Portland Electric Railroad enterprise, and will connect the two lines as soon as the new bridge over the Connecticut River between Middletown and Portland is completed. The Portland road will be built by the Middletown Company, extended three miles northward, and operated under a lease. It is said an extension will be built northward to South Glastonbury to compete with the Valley division of the New Haven road for passenger business to Middletown, from East Hartford, Manchester, Rockville, and near towns. The charter of the Portland Company provides that its road must be in operation within six months of the completion of the Connecticut River bridge now building.

The West Shore Electric road has been leased for 99 years to the Winchester Avenue Co. It extends now from Savin Rock to Merwin's Point, five miles, and is practically an extension of the Winchester Avenue line, which, with the West Shore, includes about 22 miles of track.

New London, Conn.—Work has been actively pushed on the electric road between Norwich and New London, and it will probably be opened within a few months. It will parallel closely the New London Northern steam road between those two towns, a distance of about 13 miles.

New York.—The Empire City Traction Company was incorporated last week to construct a street surface railroad in New York City, 3¼ miles in length. The road is to have two branches, one across 145th street from river to river, and the other starting from Ninety-sixth street and the North River to Columbus avenue, through Central Park to Third avenue, to Ninety-ninth street, to the East River. The capital is $100,000, and some of the directors are Henry L. Scheuman, Frank P. Knight, Edgar M Johnson, of New York City; Homer R. Scoville, of Brooklyn, and Samuel S. Slatter, of Arlington, N. J.

Work was being done last week on the extension of the Union trolley lines from Fordham to Bedford Park, in the annexed district of New York.

Oakland, Cal.—Arrangements are being made for an electric railroad from this place to Livermore and Corral Hollow.

Portland, Me.—The Portland & Cape Elizabeth Electric road has begun carrying the mails between Portland and the adjacent towns.

Portland, Ore.—An ordinance has been introduced to give the Portland Traction Company power to change the motive power of its road from cable to electricity.

The First Street Electric Railroad has been completed, and the cars of the East Side Railroad and those of the Portland Consolidated Street Railroad will be operated on the new line.

Portsmouth, Va.—The Portsmouth Electric Street Railroad has extended the indebtedness of bond issue

from $50,000 to $200,000. All the material is now on hand, and the work of construction will be actively resumed.

Rockford, Ill.—The West End Electric Railroad, of this city, has been sold to Bentley Masslick, of Chicago, representing the Guarantee Title & Trust Co.

Scranton, Pa.—The Scranton Traction Co. has begun carrying the mails from here to Dickson and Dunmore.

San Francisco, Cal.—A franchise has been granted to the Market Street Railway Co. to extend the Mission Street Electric line to Ocean View. Work is to be commenced during the first part of January. The Directors of the company have agreed to declare a dividend of 60 cents a share, payable quarterly, which is at the rate of 20 cents a share per month. There is now over $500,000 in the surplus fund, and a much larger dividend could have been declared had it not been for the decision of the Directors to set aside a certain proportion of it to meet unusual expenses that might be necessary from time to time.

The Electric Railway Hill-Cable Company has been incorporated by N. W. Griswold and others, to build a cable or electric railway, with a capital stock of $1,000,000.

South Sioux City, Neb.—The South Sioux City Traction Co. has been incorporated by Henry J. Taylor, C. A. Benton, T. L. Eaton and others, with a capital stock of $50,000.

Washington, D. C.—The building of the Washington, Alexandria & Mt. Vernon line from Alexandria to Washington is being pushed rapidly. The track is laid from Rosslyn to near the Four Mile Run cut, and the trestle across the swamp near the Waterloo brick yards, to connect with the Pennsylvania at Jackson City, will soon be finished.

A bill has been introduced in the House authorizing the Columbia Railway Company and the Metropolitan Railway Company to consolidate under the title of the Metropolitan Electric Traction Company.

H. A. Cady has been appointed Treasurer and Secretary of the Washington, Sandy Springs & Baltimore Railroad, and G. W. Jackson Chief Engineer.

GENERAL RAILROAD NEWS.

Cleveland & Pittsburgh.—The annual report shows the receipts to have been $1,366,248 from rentals, sinking fund, etc., and there was a cash balance of $14,316, making the total receipts $1,350,564. The disbursements were: Dividends, $786,923; interest, $313,630; sinking fund, $238,712, and maintenance of organization, $10,121; total, $1,349,386; surplus, $1,177. The company's year is the calendar year.

Columbus, Hocking Valley & Toledo.—Dispatches from Columbus, O., report that the attorneys of the Central Trust Co. of New York will ask for another trial of the suit of the company against Judge Stevenson Burke and others at the term of the Common Pleas, which begins this week.

Laurens.—Judge Simonton, of the United States Circuit Court at Charleston, S. C., has filed a decision approving the recent sale of this road to W. G. Childs, for $75,000 and ordering it to be concluded. The sale had been made some time ago by A. C. Haskell to Mr. Childs, who is President of the Columbia, Newbury & Laurens road. The above line extends from Newbury to Laurens, S. C., 30 miles. Objection had been made to the sale by certain of the security holders.

Louisville & Nashville.—The report of earnings for November and five months are as follows:

	1895.	1894.	Inc. or dec.	
November:				
Gross earn	$1,878,590	$1 795,020	I.	$83,570
Oper. exp	1,156,655	1,038,978	I.	117,675
Net earn	$721.937	$756,042	D.	$34,105
Since July 1:				
Gross earn	$8,96?,226	$8,470,475	I.	$491,751
Oper. exp	5,740,423	5.123,079	I.	617,344
Net earn	$3,221,803	$3,347,396	D.	$125,593

Marietta & North Georgia.—Judge W. T. Newman, of the United States Court in Atlanta, has confirmed the sale of the property to the Atlanta, Knoxville & Northern Construction Company, recently organized, and of which Charles E. Kimball, of Summit, N. J., is President.

Monterey & Mexican Gulf.—Negotiotions are reported to be in progress for the sale or lease to the Southern Pacific Road of this line, in operation from a point on the Mexican International 390 miles to Tampico, on the coast. The Mexican International is part of the Southern Pacific system, and the new line would give it important tide water connections to the southward of its present terminus. The Monterey & Mexican Gulf was in the hands of a receiver for three years, but has recently come under the control of the bondholders' committee, which holds 51 per cent. of the stock. It is stated that the committee, which has its headquarters in Belgium, has given its representatives in Mexico authority to lease the road.

New York, Pennsylvania & Ohio.—Judge Voris, at Akron, O., on application of the Farmers' Loan & Trust Co., of New York, has terminated the receivership of the railroad, and Receiver John Tod, of Cleveland, has been appointed Master Commissioner to sell the property for not less than $10,000,000 early in the Spring. The property will, of course, be purchased for the Erie Railroad.

Northeastern (Ga.).—Bids for the purchase of the Northeastern road—a line about 40 miles long—from Athens to Lula, Ga., will be received by the Governor of Georgia until Feb. 14. This road was formerly operated by the Richmond & Danville, but for two years past has been operated directly by the state, which controls a majority of the securities.

Omaha & St. Louis.—The Missouri, Kansas & Texas Trust Company has practically gained control of this road, which extends from Pattonsburg, Mo., to Omaha. The road will be made a part of the Kansas City Northern Connecting system, one of the Missouri, Kansas & Texas Trust Company's properties. The Kansas City, Pittsburgh & Gulf road is also controlled by that company, which is chiefly an investment corporation.

Oregon Railway & Navigation Co.—The General Reorganization Committee, of which A. S. Heidelbach, of New York, is Chairman, gives notice that a change in the published plan of reorganization is deemed advisable. It is proposed to amend the plan so that the trust agreement shall terminate absolutely on May 1, 1906, or at least 10 years from the sale of the company's property under foreclosure. It is provided that an earlier termination may be made by the consent of holders of two-thirds of each class of certificates of deposits of consolidated mortgage and collateral trust mortgage bondholders and stockholders, or unless dividends equal to 20 per cent. on the preferred stock shall have been paid or their payment fully guaranteed.

Prescott & Arizona Central.—The suit of the company against the Atchison, Topeka & Santa Fe and other railroad companies and their directors and stockholders was called for trial in the United States Circuit Court at New York this week before a jury. The amount of damages asked is $8,250,000. The complaint alleges that the defendants, by formal agreement, entered into a conspiracy to ruin the plaintiff company, after having vainly endeavored to get control of its capital stock. The road extends from Prescott to Seligman, Arizona. The defendants, it is charged, refused to deliver freight and passengers consigned to the plaintiff road, and in other ways so injured the latter that it was obliged to suspend operations. The defendants make a general denial of the allegations in the complaint.

St. Johns & Lake Eustis.—F. C. Brown, President of the Florida Southern, bought this road, at foreclosure sale, for $105,000, last week. The road is one of the Plant Lines, from Leesburg, Fla., on the Florida Southern, south of Ocala, northeast to Astor. The company owns about 48 miles of road, and has been in the control of a receiver for some time.

Summit Branch.—This road, a leased line of the Pennsylvania, has defaulted in the payment of the January coupons on its general mortgage bonds, bearing 7 per cent interest. Last year the Pennsylvania advanced $25,000 to meet the charges, the company owning a majority of the stock and about 35 per cent. of the bonds. Gross earnings in 1895 showed small increases, but the net revenues were increased by cutting down operating expenses. Foreclosure proceedings are regarded as likely to follow the default.

Toledo, Ann Arbor & North Michigan.—An outstanding claim held by Post, Martin & Co. against the company and secured by a lien on part of the rolling stock, has been settled by the payment to that firm of $100,000. This amount was agreed upon by the reorganization committee and sanctioned by the Circuit Court.

Union Pacific.—The Reorganization Committee, of which Gen. Louis Fitzgerald is chairman, announces that it has received a majority of all Union division main line and Kansas division first mortgage bonds in circulation, as well as large deposits of junior bonds and nearly one-half of the capital stock. The committee gives notice of its intention to proceed promptly and energetically with general foreclosures.

Washington & Chesapeake Beach.—After listening to argument of counsel Judge Morris in the United States Circuit Court at Baltimore, has declined to set aside the sale of the road at Upper Marlboro, on Dec. 10. The road is projected to connect Washington with a pleasure resort, which it is contemplated building at Chesapeake Beach, in Calvert County. The road brought only $31,000, and this was objected to by some of the stockholders as insufficient.

Electric Railroad News.

Buffalo, N. Y.—Mayor Jewett has signed the franchise granted to the Buffalo Traction Co. by the Common Council.

Chicago.—On Jan. 1, in accordance with an ordinance issued by the City Council, the surface car lines of Chicago began to stop their cars at the near side of street crossings. It is hoped by this change that the danger of collisions will be lessened. Quite a number of these collisions between electric and cable cars have recently occurred in the downtown district.

New Haven, Conn.—Judge Townsend, of the United States Court, has reopened the case of the Thomson-Houston Electric Co. against the Winchester Avenue Railroad Company, a decision in which case was rendered for the plaintiff a few weeks ago.

TRAFFIC.

Traffic Notes.

The Citizens' Street Railway, of Detroit, announces a universal rate of three cents for fares on all lines at all hours.

For three successive months the Pennsylvania has broken the record in the matter of the freight movement through the Harrisburg yards. In October the total movement was 134,669 cars; November, 136,943, and December, 139,726, of which 80,248 cars were loaded.

In a suit tried in the Supreme Court in Brooklyn, N. Y., last week, a colored woman who claimed damages for being compelled to ride in an inferior passenger car on the Southern Railway, in the State of Tennessee, secured a verdict of $500 damages. Her suit was against Samuel Spencer, Receiver of the road.

The Florida Special of the Pennsylvania Atlantic Coast Line and Plant System began running January 6. The time, New York to Jacksonville, is 26 hours. The train is composed wholly of Pullman cars, lighted by electricity and heated by steam, but there is no extra charge other than the regular Pullman car fare.

The number of immigrants arriving at New York during the year 1895 (December partly estimated) was 229,607, an increase of 61,944 over the previous year. The Commissioner of Emigration says that the character of the emigrants is much better than in previous years, in consequence of the rigid enforcement of the emigration laws.

It is announced at San Francisco that, as a consequence of the recent advance in rates between New York and the Pacific Coast, by the Panama route, freight rates to the East over the Southern Pacific on a number of commodities will soon be advanced. The principal commodities named are barley, canned goods and wine, on which the rates have been abnormally low.

Chicago Traffic Matters.

CHICAGO, Jan. 8, 1896.

The members of the Western Passenger Association are somewhat disturbed over a ruling made by the chairman in regard to the sale of mileage books to business houses for use of their traveling men. Under the new agreement the rules regarding the issuance of the 2,000-mile descriptive books require that they shall be made out in the name of the party for whom they are to be used and sold to the users in person. The large firms desire to purchase a number of books in blank and send them to their traveling men as required, and few of the roads have the nerve to refuse a substantial check tendered in payment for books for this purpose. On the other hand, there is no doubt that if the rule is waived in this case it will afford a loophole for such of the lines as wish to place a few books with friendly scalpers, and the result will be that the intent and purpose of the rule will be defeated.

No progress has been made toward fixing the percentages to govern traffic passing through the lower Missouri River gateways, and it is doubtful if the interested roads can agree among themselves as to the proportions. When the agreement was made a year ago, percentages were agreed upon and immediately after two of the members indulged in manipulations for the sole purpose, as charged by their competitors, of increasing their tonnage so as to be able to claim that the percentages agreed to were manifestly unfair, which they proceeded to do as soon as possible; and the other roads as promptly told them they had been securing their tonnage by illegal methods, the result finally being the breaking up of the agreement. When it was proposed to revive the agreement some of the parties remembered the experience last year and flatly declined to become parties to another agreement unless some way was devised whereby such practices could be stopped.

Commissioner Midgely, acting in his capacity as chairman of the pass agreement, has issued a circular in which he states that the outlook for the 1896 pass agreement is encouraging, and he believes its results will be very beneficial. Several rulings are made, among them the following: Cattle dealers and stockmen are not to receive free transportation when not accompanying stock. Regarding the issuance of passes to persons who are shippers, or are in position to influence business, on account of bondsmen, a resolution has been adopted that such practice is a violation of the spirit of the agreement and should be discontinued, and that the roads arrange for not more than three bondsmen at the general headquarters of the road who shall not be shippers or in position to influence business. Regarding annual passes for car inspectors of private car companies, the company making such requests must specify the duties of the inspectors and the points between which they are to travel.

At a meeting held at Omaha last week an agreement was reached regarding Montana and Utah passenger business, and hereafter (for a while) the lines will work in harmony.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending Jan. 4, amounted to 94,499 tons, against 75,881 tons during the preceding week, an increase of 18,618 tons, and against 32,636 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	WEEK TO JAN. 4.		WEEK TO DEC. 28.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central	11,922	12.6	8,232	10.8
Wabash	7,926	8.4	4,512	5.9
Lake Shore & Mich. South.	13,776	14.6	15,898	20.9
Pitts., Ft. Wayne & Chicago	6,855	7.2	5,434	7.2
Pitts., Cin., Chi. & St. Louis.	8.998	9.6	5.358	7.1
Baltimore & Ohio	6,279	6.6	5,080	6.7
Chicago & Grand Trunk	15,248	16.0	15,835	20.9
New York, Chic. & St. Louis	10,678	11.3	8.683	11.5
Erie	9,490	10.6	2,920	3.8
C., C., C. & St. Louis	3,327	3.6	3,929	5.2
Totals	94,499	100.0	75,881	100.0

Of the above shipments, 5,255 tons were flour, 53,709 tons grain and mill stuff, 20,063 tons cured meats, 7,258 tons dressed beef, 1,281 tons butter, 1,388 tons hides, and 2,751 tons lumber. The three Vanderbilt lines carried 38.5 per cent.; the two Pennsylvania lines, 16.8 per cent.

New Orleans Freight Traffic.

President Stuyvesant Fish, of the Illinois Central, has addressed a letter to the Mayor of New Orleans urging the city authorities to allow the company to improve a large tract of land it acquired some time ago. In the course of his argument President Fish submits a statement of tons of freight forwarded from and received at New Orleans by all the railroads during the year ended June 30, 1895:

Railroads.	Forwarded.	Received.	Handled.
Illinois Central	235,021	743,181	978,202
Y. & M. V	90,223	495,125	585,348
Totals	325,244	1,238,306	1,563,550
N. O. & Northeastern	198,069	383,644	581,713
Louisville & Nashville	276,095	337,286	613,381
Texas & Pacific	155,188	331,053	486,241
Southern Pacific	354,596	477,131	831,727
Totals	983,948	1,529,114	2,513,062

The Illinois Central and Yazoo & Mississippi Valley railroads each brought into New Orleans more freight than any one of the other railroads did, and taken together, they carried in four-fifths as much as was brought by all the other roads. President Fish argues that the increased facilities would materially increase the commerce of New Orleans, and calls attention to the fact that it is the only seaport that the company is interested in building up, and that to that end it has agencies abroad calculated to extend both the import and export trade of the city.

Grain Rates to Gulf Ports.

The Chicago lines have been exceedingly uneasy for some time on account of the heavy movement of corn to Newport News and to New Orleans and other Gulf ports. A meeting was held in St. Louis last week and the representatives of the Chicago lines plainly told the Missouri Pacific and the Missouri, Kansas & Texas that unless rates were equalized measures would be at once taken to compel an equalization that would result in moving the grain via Chicago. At present they are making a rate of 15 cents to the Gulf ports against a 20-cent rate to Chicago, both from the Missouri River. It was finally agreed that the whole question should be referred to J. N. Faithorn, ex-Chairman of the Southwestern Traffic Association, his decision to be final and to continue in effect until July 1, 1897, and thereafter subject to 60 days' notice.

Mr. Faithorn is to decide before Jan. 20, and a resolution was also adopted that all grain rates shall be advanced Jan. 20 to tariff, except that pending this arbitration rates from all trans-Missouri points shall be the same to New Orleans and Galveston. Present rates to Newport News and New York from Missouri River points are 37 and 40 cents, respectively. The proposed advanced rates will be: Missouri River to New Orleans and Galveston, 27 cents; Chicago, 20 cents; Newport News, 35 cents, and New York 40 cents. A St. Louis paper says that Mr. Faithorn is also to say what percentage of the traffic each road ought to carry.